The Chemical Age

VOL. LXXVII No. 1957

12 January 1957

ANNUAL REVIEW NUMBER

It's "Metal Containers" Age

METAL CONTAINERS LTD., 17 WATERLOO PLACE, PALL MALL, LONDON

WORKS: ELLESMERE PORT & RENFREW ASSOCIATED COMPANIES OVERSEAS

CALLOW ROCK

Gas-Burnt

LIME

for all purposes

• • •

QUICKLIME
(*Calcium Oxide*)
of the highest commercial quality, in lumps or in coarse powder form

HYDRATED LIME
(*Calcium Hydroxide*)
in Standard and Superfine grades to meet most industrial requirements

• • •

The Callow Rock Lime Co. Ltd.
CHEDDAR, Somerset
Agents: DURHAM RAW MATERIALS, LTD.,
1-4 Great Tower Street, LONDON, E.C.3

These are just a few of the products we handle:

Arsenic	Manganese Sulphate
Barium Chloride	Oxalic Acid
Calcium Acetate	Paraformaldehyde
Caustic Soda Solid and Flakes	Potassium Carbonate Calcined and Hydrated
Caustic Potash Solid and Flakes	Potassium Ferrocyanide
Copper Sulphate	Potassium Ferricyanide
Cuprous Oxide	Potassium Metabisulphite
Di Ammonium Phosphate	Selenium
Di Calcium Phosphate	Sodium Acetate
Ferrous Sulphate	Sodium Chlorate
Lead Acetate	Sodium Ferrocyanide
Lead Nitrate	Sodium Silico Fluoride
Lime (High Grade)	Sodium Sulphate Anhydrous
Magnesium Sulphate	Zinc Sulphate

CHEMICALS and FEEDS LTD

ADELAIDE HOUSE,
LONDON, E.C.4

Telephone: MANsion House 9621 (3 lines)
Telegrams: 'Chemifeed', London

International Distributors and Manufacturers Agents

Associated with: P. Leiner & Sons, Ltd., Treforest Chemical Co. Ltd., Glamorgan Alkali & Acid Co. Ltd., Miskin Lime Co. Ltd., and other U.K. and overseas manufacturers.

"REDAC" PRODUCTS

ACID RESISTING EARTHENWARE

'HUNCOAT' REDAC

Enquiries Welcomed

ACID RESISTING
TILES · BRICKS
ACID TOWER
PACKINGS
RINGS AND BALLS

Successfully used in

GAILLARD TOWERS · ACID OIL SETTLING TANKS · GAS WASHERS
CHIMNEY LININGS · ASH SLUICES
HYDROCHLORIC PICKLING TANKS
ETC.

B. WHITAKER & SONS, LTD.

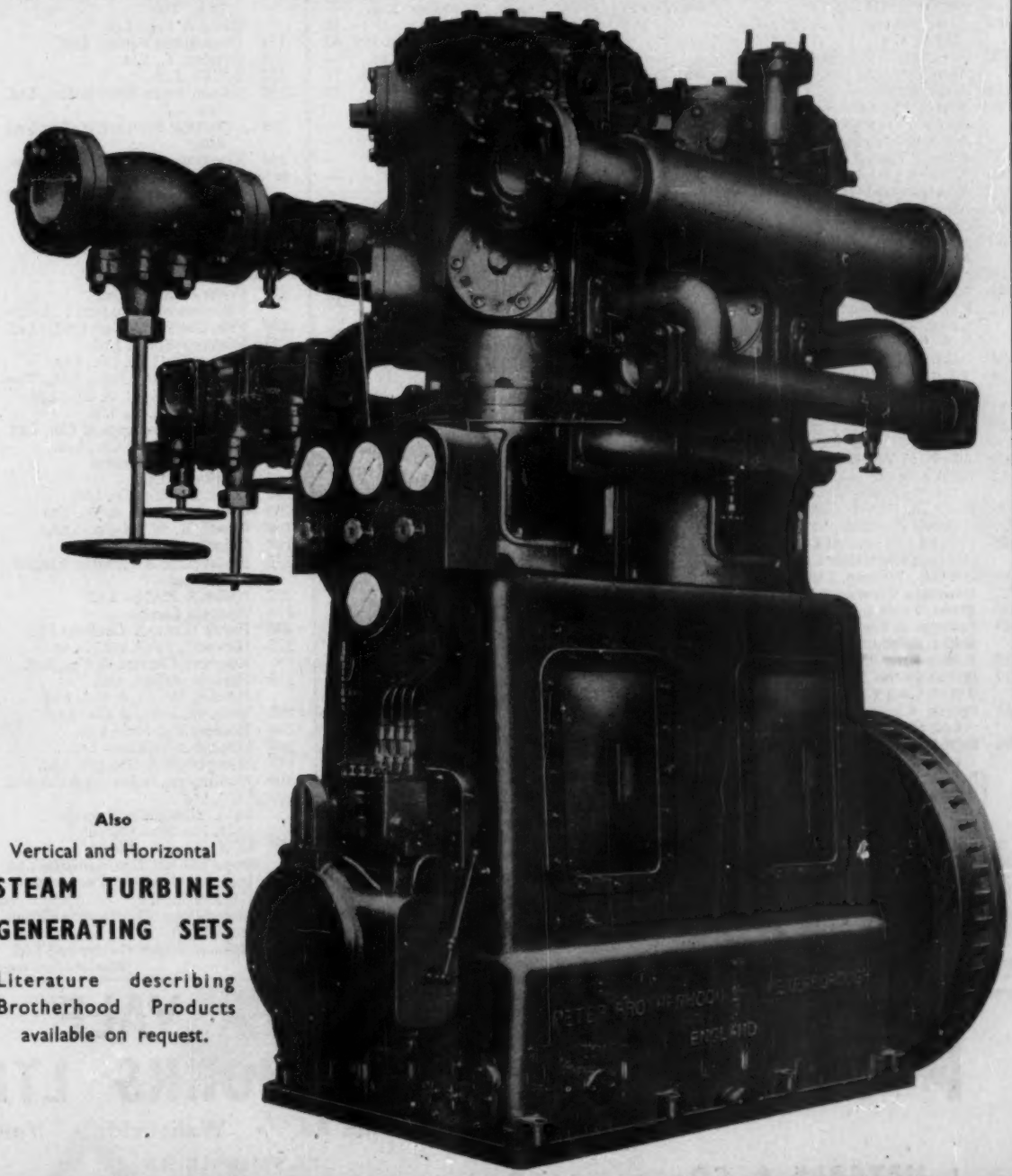
ST. STEPHENS HOUSE, WESTMINSTER

Phone: Whitehall 3616 *Works: ACCRINGTON, LANCS.* *Grams: Bricavity, Parl, London*

BROTHERHOOD Air, Gas and Refrigerating **Compressors**

For the manufacture of

ARTIFICIAL FERTILISERS and other CHEMICALS



Also

Vertical and Horizontal

STEAM TURBINES

GENERATING SETS

Literature describing Brotherhood Products available on request.

PETER BROTHERHOOD LTD

PETERBOROUGH · ENGLAND

COMPRESSOR & POWER PLANT SPECIALISTS FOR NEARLY A CENTURY

A

INDEX TO ADVERTISERS

The first figures refer to advertisement in **The Chemical Age Year Book**, *the second to the current issue*

Page		Page
229	A.P.V. Co., Ltd., The	—
344	Acalor (1948) Ltd.	—
209	Accrington Brick & Tile Co., Ltd., The	—
176	Adequate Weighers Ltd.	—
	Aero Research Ltd.	45
223	Aimer Products Ltd.	64
159	Albany Engineering Co. Ltd. The	—
	Alexander, Herbert, & Co., Ltd.	—
	Alginate Industries Ltd.	—
165	Allen, Edgar, & Co., Ltd.	—
364	Alumina Co., Ltd., The	37
328	Amalgamated Oxides (1939) Ltd.	—
306	Armour & Co., Ltd.	31
G/Cd.	Ashmore, Benson, Pease & Co.	—
189	Ashworth, Arthur, Ltd.	—
	Associated Lead Mfrs. Ltd.	—
G/Cd.	Audley Engineering Co., Ltd.	41
146	Autometric Pumps Ltd.	—
212	B. A. Holland Engineering Co., Ltd., The	62
	B.X. Plastics Ltd.	—
282	Baker Perkins Ltd.	
324	Baker Platinum Division, Engelhard Industries Ltd.	—
233	Balfour, Henry, & Co.	—
210	Barclay Kellett & Co., Ltd.	—
250	Bennett, Sons & Shears Ltd.	—
G/Cd.	Berk, F. W., & Co., Ltd.	
242	Beryllium & Copper Alloys (Safety Tools) Ltd.	—
270	Black, B., & Son, Ltd.	—
204	Blundell & Crompton Ltd.	—
148	Borax Consolidated Ltd.	—
	Borax & Chemicals Ltd.	—
289	Boulton, William, Ltd.	—
228	Bowmans Chemicals Ltd.	—
270	Braby, Fredk., & Co., Ltd.	63
183	Bramigk & Co., Ltd.	—
	British Acheson Electrodes Ltd.	53
224	British Arca Regulators Ltd.	—
217	British Carbo Norit Union Ltd.	44
	British Ceca Co., Ltd., The	—
216	British Chrome & Chemicals Ltd. (London)	—
230	British Chrome & Chemicals Ltd. (Lancs)	—
	British Drug Houses Ltd., The	70
	British Electrical Development Association	—
	British Geon Limited	47
8	British Industrial Solvents	—
236 & 237	British Laboratory Ware Association Ltd.	—
275	British LaBour Pump Co., Ltd.	—
240	British Lead Mills Ltd.	—
360	British Railway Traffic & Electric Co., Ltd.	—
Spine	British Resin Products Ltd.	—
172	British Rototherm Co. Ltd. The	—
227	British Steam Specialties Ltd.	—
168	British Tar Products Ltd.	70
	British Thomson-Houston Co. Ltd.	43
170	British Titan Products Co., Ltd.	—
397	Broadbent, Thomas, & Sons, Ltd.	71
231	Brotherhood, Peter, Ltd.	29
244	Brotherton & Co., Ltd.	—
	Brough, E. A., & Co., Ltd.	—
234	Browns Foundry Co., Ltd.	—
218	Brush Design Group, The	—
175	Bryan Donkin Co., Ltd., The	—
180	Buell (1952) Ltd.	—
272	Burnett & Rolfe Ltd.	—
	Buss & Co.	—
	Butterworths Scientific Publications	—
201	Butterfield, W. P., Ltd.	—
160	Calder Vale Glassworks Ltd.	30
	Callow, F. E. (Engineers) Ltd.	—
	Callow Rock Lime Co. Ltd. The	cov. ii
354	Candy Filter Co., Ltd., The	—
	Cannon (G. A.) Ltd.	—
238	Carbon Dioxide Co., The	—
280	Carmichael, John R., Ltd.	—
243	Catalin Ltd.	—
	Chapman & Hall Ltd.	—
191	Chemical Workers' Union, The	—
	Chemicals & Feeds Ltd.	cov. ii
318	Chemitrade Ltd.	—
284	Chesterfield Tube Co., Ltd., The	—
203	Ciech Ltd.	—
264	Cinema Television Ltd.	45
224	Clark, T. C., & Co., Ltd.	56
	Classified Advertisements	106 & 107
258	Clayton Dyestuffs Co. Ltd. The	—
199	Clayton, Son & Co., Ltd.	—
	Clydesdale Chemical Co. Ltd.	62
285	Clyde Tube Forgings Ltd.	—
213	Cole, R. H., & Co., Ltd.	—
208	Cole & Wilson Ltd.	36
204	Collins Improved Firebars Ltd.	108
348	Comet Pump & Eng. Co. Ltd. The	—
	Controlled Convection Drying Co.	—
	Costain-John Brown Ltd.	57
4	Crofts (Engineers) Ltd.	—
	Cromil & Piercy Ltd.	50
171	Cruickshank, R., Ltd.	—
334	Curran, Edward, Engineering Ltd.	—
304	Cyanamid Products Ltd.	—
222	Cyclops Engineering Co. Ltd. The	—
288	Cygnet Joinery Ltd.	—
286	Danks of Netherton Ltd.	—
216	Davey, Paxman & Co., Ltd.	—
	Dawson, McDonald & Dawson Ltd.	—
170	Derby Luminescents Ltd.	—
161	Dorr-Oliver Co., Ltd.	38
280	Douglas, William, & Sons Ltd.	—
200	Dowlow Lime & Stone Co., Ltd., The	—
	Dring & Fage Ltd.	—
174	Drummond Patents Ltd.	—
195	Dryden, T., Ltd.	65
232	E.C.D., Ltd.	—
330	Edison Swan Electric Co., Ltd. The	—
268	Electronic Switchgear (London) Ltd.	—
244	Electrothermal Engineering Ltd.	—
B/Mk.	Elliott, H. J., Ltd.	48
166	English Glass Co., Ltd., The	—
G/Cd.	Erinoid Ltd.	—
207	Evered & Co., Ltd.	—
	Ewart, M. D., & Co., Ltd.	—
208	Farnell Carbons Ltd.	32
	Fawcett Finney Ltd.	—
202	Ferris, J. & E., Ltd.	50
	Fleischmann (London) Ltd.	108
220	Film Cooling Towers (1925) Ltd.	—
253	Foxboro-Yoxall Ltd.	103
	Fraser, W. J., & Co., Ltd.	—
298	Fuller's Earth Union Ltd., The	—
188	Gallenkamp, A., & Co., Ltd.	—
	Geigy Co., Ltd., The	—
266	Geigy Pharmaceutical Co., Ltd.	—
	General Electric Co., Ltd.	—
	Glebe Mines Limited	—
	Gowlands Ltd.	56
290	Graviner Mfg. Co. Ltd.	—
265	Grazebrook, M. & W., Ltd.	—
164	Greeff, R. W., & Co., Ltd.	—
192	Grindley & Co., Ltd.	—
232	Hackbridge & Hewittic Electric Co., Ltd.	—
202	Haller & Phillips Ltd.	—
214	Hanovia Lamps	—
206	Harris (Lostock Gralam) Ltd.	—
222	Haworth, F. (A.R.C.) Ltd.	46
158	Hearson, Charles, & Co., Ltd.	72
238	Herbert, Alfred, Ltd.	—
	Holmes, W. C., & Co., Ltd.	—
193	Holroyd, John, & Co., Ltd.	—
234	Honeywill & Stein Ltd.	—
248	Hopkin & Williams Ltd.	—
187	Humphreys & Glasgow Ltd.	—
310	Huntington, Heberlein & Co. Ltd.	—
	I.C.I. Ltd.	—
	I.C.I. Billingham Organic	35
	I.C.I. Plastics—Darvic	—
	I.C.I. Plastics—Fluon.	—
	Imperial Chemical Industries Ltd.	—
157	Imperial Smelting Corporation (Sales) Ltd.	cov. iv
	International Combustion Group	—
	Isopad Ltd.	64
246	Jackson, Henry (Liverpool) Ltd.	—

[*continued on page 32*

STEARINE PITCH

All Grades

METCALF & CO.
VICTORIA CHEMICAL WORKS
CLIFTON STREET

MILES PLATTING
MANCHESTER · 10

Tel. Collyhurst 1294

CALDER VALE GLASSWORKS LTD

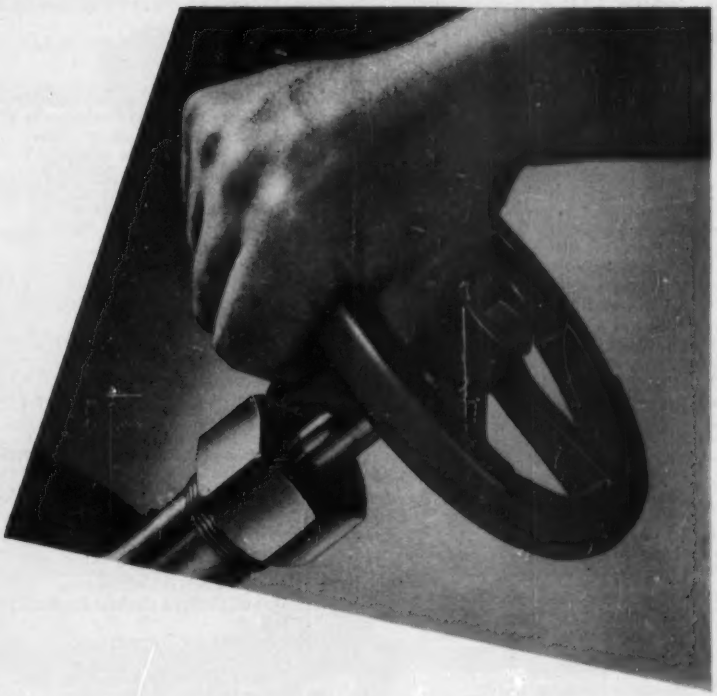
Calder Vale Rd. • Wakefield • Yorks

TEL. WAKEFIELD 3857

● SPECIALISTS IN ●

Carboys · Demijohns Winchesters

ARMOUR CHEMICALS



Armour chemicals are all of the cationic or nonionic type.

They include *Armeens* (primary, secondary and tertiary aliphatic amines), *Armacs* (water soluble salts of aliphatic amines) and *Duomeens* (aliphatic diamines). There are over 1,000 known uses of Armour chemicals spread over many industries. Some of these applications are described in the booklets "Armeens", "Armacs", and "Duomeens", for which please ask. Armour specialists are available to advise.

ARMOUR is the biggest name in cationic chemicals
Production in two continents

ARMOUR & COMPANY LTD., CHEMICAL DIVISION, LINDSEY ST., LONDON, E.C.1

* *Armour Chemicals in Great Britain are produced for Armour & Company Ltd., by Hess Products Ltd., Leeds.*

INDEX TO ADVERTISERS

The first figures refer to advertisement in **The Chemical Age Year Book**, *the second to the current issue*

Page		Page
214	Jackson, J. G., & Crockatt Ltd.	—
245	Jenkins, Robert, & Co., Ltd.	—
249	Jenkinson, W. G., Ltd.	—
3	Jobling, James A., & Co., Ltd.	50
	Johnson, S. H., & Co., Ltd.	36
166	Johnsons of Hendon Ltd.	—
267	Jones, Tate & Co., Ltd.	—
228	K.D.G. Instruments Ltd.	52
178	K.W. Chemicals Ltd.	—
	Kaylene (Chemicals) Ltd.	—
2	Keith Blackman Ltd.	—
278	Kernick & Son Ltd.	—
395	Kestner Evaporator & Engineering Co., Ltd.	104
	Key Engineering Co. Ltd. The	
283	Kier, J. L., & Co., Ltd.	
271	Kleen-e-ze Brush Co., Ltd.	42
206	Lankro Chemicals Ltd.	—
210	Laporte Chemicals Ltd.	52
184	Lavino (London) Ltd.	58
252	Leda Chemicals Ltd.	—
264	Leek Chemicals Ltd.	—
162	Leigh & Sons Metal Works Ltd.	—
	Leitch, John W., & Co., Ltd.	60
	Lennig, Charles, & Co. (Great Britain) Ltd.	74
	Lennox Foundry Co., Ltd.	—
219	Light, L., & Co., Ltd.	66
274	Lind, Peter, & Co., Ltd.	—
Cover	London Aluminium Co. Ltd. The	—
278	Lord, John L., & Son	cov. iii
190	Machinery (Continental) Ltd.	—
257	Mallinson & Eckersley Ltd.	—
	Manchester College of Science & Technology	105
	Manesty Machines	—
342	Marchon Products Ltd.	—
226	Marco Conveyor & Eng. Co. Ltd.	—
168	Matthews & Yates Ltd.	—
	May & Baker Ltd.	—
173	Measuring & Scientific Equipment Ltd.	—
	Meigh Castings Ltd.	—
Cover	Metal Containers Ltd.	front cover
	Metalfiltration Co., Ltd.	—
G/Cd.	Metalock (Britain) Ltd.	51
174	Metcalf & Co.	30
	Metropolitan - Vickers Electrical Co., Ltd.	—
178	Middleton & Co., Ltd.	54
	Mills Packard Construction Co. Ltd.	—
215	Mine Safety Appliances Co. Ltd.	—
	Mirrlees Watson & Co. Ltd. The	—
180	Mirvale Chemical Co., Ltd.	—
254	Mitchell, Cotts & Co., Ltd.	—
	Mond Nickel Co., Ltd., The	—
	Monsanto Chemicals Ltd.	—
	Morgan Crucible Co., Ltd., The	—
200	Moritz Chemical Engineering Co., Ltd.	—
181	Neckar Water Softener Co. Ltd.	42
	National Industrial Fuel Efficiency Service	105
	Nederlandsche Verkoopkantoor Voor Chemische Producten N.V.	67
268	Nederlandse Emballage Ondeerneming Gebr. de Wilde N.V.	—
221	Negretti & Zambra Ltd.	—
276 & 277	Newton Chambers & Co. Ltd.	—
	New Metals & Chemicals Ltd.	—
239	Nicolson, W. B. (Scientific Instruments) Ltd.	—
177	Nordac Ltd.	—
211	North Thames Gas Board	—
194	Northern Malleable Foundry Co., Ltd., The	—
179	Northey Rotary Compressors Ltd.	—
	Northide Ltd.	55
296	Palfrey, William, Ltd.	—
	Paper Goods Manufacturing Co., Ltd.	—
	Pascall Engineering Co. Ltd. The	—
6	Paterson Engineering Co. Ltd. The	40
287	Peabody Ltd.	—
	Penhryn Quarries Ltd.	—
320 & 368	Permutit Co., Ltd., The	101
G/Cd.	Petrocarbon Developments Ltd.	—
	Petrochemicals Ltd.	—
340	Pool, J. F., Ltd.	—
	Pott, Cassels & Williamson	60
358	Powell Duffryn Carbon Products Ltd.	—
G/Cd.	Power-Gas Corporation, Ltd. The	—
246	Press at Coombelands, Ltd., The	—
169	Price Stutfield & Co., Ltd.	—
	Prodorite Ltd.	cov. iii
242	Production Chemicals (Rochdale) Ltd.	—
261	Pye, W. G., & Co., Ltd.	—
	Pyrethrum Board of Kenya	—
	Q.V.F. Ltd.	—
314	Reads Ltd.	—
	Richmond Welding Co., Ltd	—
	Robinson, F., & Co., Ltd.	—
G/Cd.	Rose, Downs & Thompson Ltd.	—
230	Rotometer Manufacturing Co. Ltd.	—
167	St. Helens Cable & Rubber Co. Ltd.	—
269	Sandiacre Screw Co., Ltd., The	44
182	Scientific Glass-Blowing Co. The	—
285	Shaw Petrie Ltd.	—
255	Sheepbridge Alloy Castings Ltd.	—
356	Shell Chemical Co., Ltd.	33
256	Siebe, Gorman & Co., Ltd.	—
350	Sigmund Pumps Ltd.	—
	Simon, Richard, & Sons, Ltd.	—
	South London Electrical Equipment Co. Ltd.	58
344	Southern Instruments Computer Division	108
338	Spencer Chapman & Messel Ltd.	39
	Stabilag Co., Ltd., The	107
396	Stanton Instruments Ltd.	—
	Staveley Iron & Chemical Co. Ltd.	66
212	Steel, J. M., & Co., Ltd.	—
	Stockdale Engineering Co., Ltd.	—
	Stonehouse Paper & Bags Mills	—
	Streamline Filters Ltd.	—
	Sturge, John & E., Ltd.	69
251	Sutcliffe Speakman & Co., Ltd.	—
279	Taylor Rustless Fittings Co. Ltd.	34
235	Tenaplas Sales Ltd.	—
218	Thermal Syndicate Ltd., The	68
196	Thomas & Bishop Ltd.	—
	Thomason, W., & Sons Ltd.	32
145	Thompson, John (Dudley) Ltd.	—
	Todd Bros. (St. Helens & Widnes) Ltd.	—
198	Towers, J. W., & Co., Ltd.	48
197	Trent Valve Co., Ltd.	—
160	Tungstone Products Ltd.	—
259	Unifloc Ltd.	—
	Unilever Ltd.	—
	United Coke & Chemicals Co. Ltd.	49
247	United Filters & Engineering Ltd.	—
192	W.E.X. Traders Ltd.	54
241	Walker Extract & Chemical Co. Ltd.	—
	Wallach Bros. Ltd.	—
263	Waller, George, & Son Ltd.	38
161	Walley, A. L.	—
162	Wallis, Charles, & Sons (Sacks) Ltd.	42
185	Watson, Laidlaw & Co., Ltd.	—
	Weinreb & Randall Ltd.	—
260	Wells, A. C., & Co., Ltd.	—
182	Wengers Ltd.	34
217	Whessoe Ltd.	—
196	Whitaker, B., & Sons Ltd.	cov. ii
163	Widnes Foundry & Engineering Co., Ltd.	59
	Wilkinson, James, & Son, Ltd.	—
186	Wilkinson Rubber Linatex Ltd.	—
273	Willcox, W. H., & Co., Ltd.	—
194	Williams, & James (Engineers) Ltd.	—
172	Wilson, Edward, & Son Ltd.	—
268	Wilde, Gebr. De Nederlandse Emballage Ondernemming N.V.	—
220	Wood, Harold, & Sons Ltd.	—
184	Worcester Royal Porcelain Co., Ltd., The	—
	Worthington-Simpson Ltd.	61
281	Wynn (Valves) Ltd.	—
225	Yorkshire Tar Distillers Ltd.	—
226	Zeal, G. H., Ltd.	56

CHEMICAL LEADWORK

Fabricated Lead Sheets and Pipes. Homogeneous Interior Lead lining of flanged mild steel tubes, bends, and tees.

W. THOMASON & SONS, LTD.

Walton Works, Great Moor Street, BOLTON

Established 1875 *Telephone 306*

Decolorising **CARBON**

ALL GRADES FOR ALL TRADES

HIGHEST EFFICIENCY LOWEST PRICES

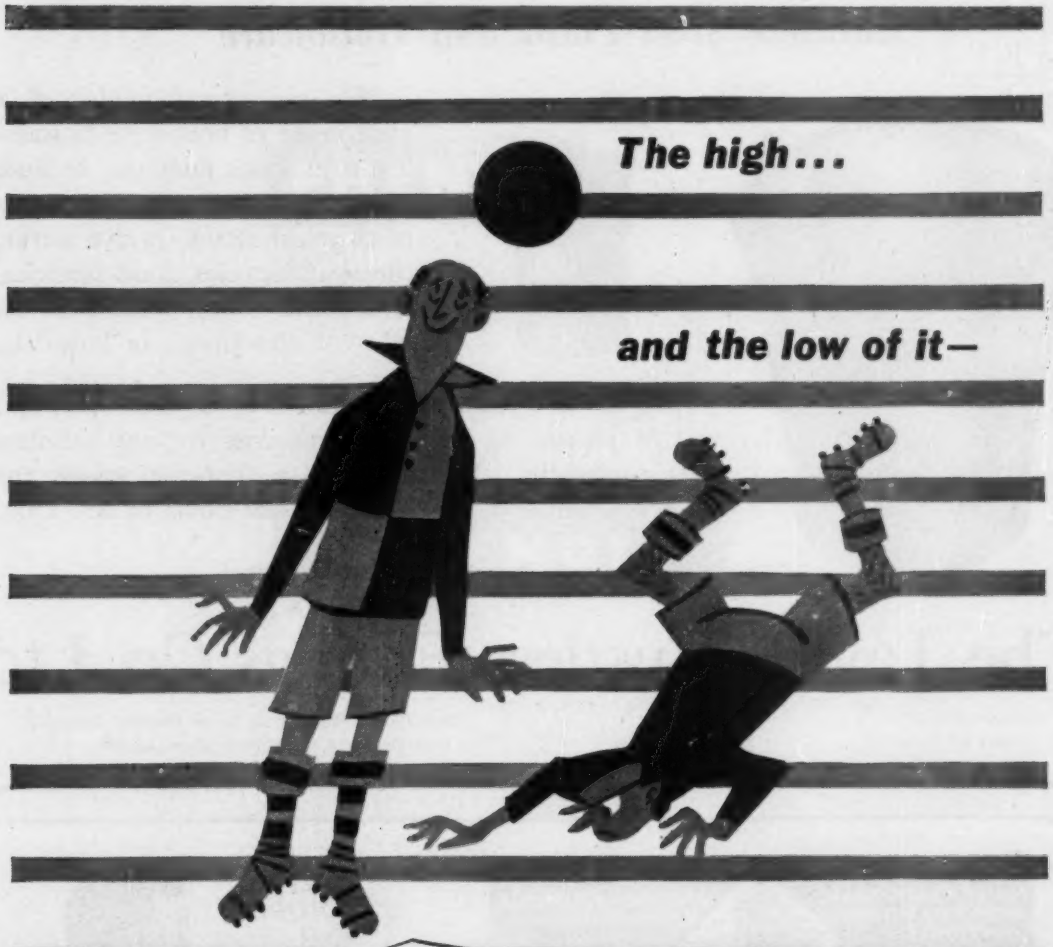
Granular Carbon for Solvent Recovery Regeneration of Spent Carbon

Write for samples and quotations.

FARNELL CARBONS LIMITED

CONDUIT ROAD, PLUMSTEAD, LONDON, S.E.18

Telephone: *Woolwich 1158 (2 lines)* *Telegrams:* *Scofar, Wol, London*



Make use of the advantages offered by Shell Ketones to improve lacquer formulations. With Shell Ketones you can have it either way—more economical formulations with equal performance . . . or higher quality formulations for equal solvent cost. High diluent tolerance, high solvent power, better viscosity control, low specific gravities—these are the characteristics of Shell Ketones that make them the answer to so many formulating problems. Ask Shell Chemicals for further information.

Formulate with Shell Ketones

for high performance at low cost

SHELL CHEMICAL COMPANY LIMITED, 105-109 Strand, London, W.C.2. *Tel: Temple Bar 4455*

Sales Offices: **LONDON:** Walter House, Bedford Street, W.C.2. *Tel: Temple Bar 4455* **GLASGOW:** 124 St. Vincent Street, C.2. *Tel: Glasgow Central 9561.*
MANCHESTER: 144-146 Deansgate. *Tel: Deansgate 6451* **BELFAST:** 35-37 Boyne Square. *Tel: Belfast 20081.*
BIRMINGHAM: 14-20 Corporation Street, 2. *Tel: Midland 6954-8* **DUBLIN:** 53 Middle Abbey Street. *Tel: Dublin 45775.*

T R F

Stainless Steel Plant and Holloware

We are manufacturers of a wide range of holloware in stainless steel which finds use, because of its resistance to many forms of chemical attack, in dye works, chemical factories, food factories, laboratories and, because of its inherent cleanliness, in hospitals.

We are also plant manufacturers in stainless steel, and will be pleased to have your enquiries for any stainless steel equipment. We are able to fabricate vessels for light, medium and severe duty as laid down in BS. 1500.

Ask for our leaflets.

The Taylor Rustless Fittings Co. Ltd.

Leeds 638711/2
Abbey 1575

Head Office:—Ring Road, Lower Wortley, Leeds, 12
London Office:—14, Great Peter Street, London, S.W.1

GROUND BONE, FELSPAR, FLINT, FLUORSPAR, QUARTZ, STONE, WHITING, ETC.,
CARBONATE & SULPHATE OF BARYTES
TRADE
CERAMIC
MARK
OXIDES OF ANTIMONY, ARSENIC, CHROME, COBALT, SMALTS, COPPER, IRON MANGANESE, NICKEL, TIN, TITANIUM,
ZINC, ETC
WENGERS, LTD.
CERAMIC COLOURS & CHEMICALS
ETRURIA.
STOKE-ON-TRENT.
England.
COLOURS FOR POTTERS, GLAZED BRICK MANUFACTURERS & GLASSMAKERS.
Samples & Price Lists Sent on Demand.
PREPARED ENAMELS FOR CAST & SHEET IRON, COPPER & JEWELLERY.

Lead Antimoniate *Calcium Phosphate* *Lead Borate*
Purple of Cassius *Distilled Water* *Lead Chloride*

MANUFACTURERS OF

CERAMIC COLOURS, CHEMICALS, GLAZES, VITREOUS ENAMELS, MINERALS AND MATERIALS

for the Pottery, Tile, Brick, Glass & Vitreous Enamelling on Metal, Cement & Plastics Industries

PHENOL

A high-quality synthetic product meeting the most stringent requirements of industry.

XYLENOLS

A grade of refined cresylic acid of distillation range approximately 215°-230°C. Total tar acid content 99·5% minimum.

HIGH BOILING TAR ACIDS

Distillation range approximately 220°-260°C. Total tar acid content 99·0% minimum.

ICI

For further information, consult:

IMPERIAL CHEMICAL INDUSTRIES LTD.
LONDON, S.W.1

FILTER-PRESSING PLANT

FOR WORKS EFFLUENTS, CHEMICAL PRODUCTS, ETC.

AUTOMATIC FORCING RAMS for Charging Filter Presses. Air and Gas Compressors. SPECIAL PUMPS for Acid and Gritty Liquors. VACUUM PUMPS. MIXERS of many types and sizes. OIL REFINING PLANT, Etc.

S. H. JOHNSON & Co Ltd

TELEPHONE: MARYLAND 7431 (6 lines)

Chemical Engineers

TELEGRAMS: FILTRUM EASPHONE, LONDON

CARPENTER'S ROAD, STRATFORD, LONDON, E.15

Agents for Australasia :— SWIFT & COMPANY (PTY.) LIMITED Geelong House, 26/30 Clarence Street, SYDNEY, New South Wales.

Agents for Canada :— DOMINION SCOTT BARRON LIMITED 629 Eastern Avenue, Toronto, 2.

Agents for South Africa :— THE DRYDEN ENGINEERING CO. (PTY.) LTD., Preston House, SELBY, P.O. Box 815, Johannesburg.

YORKSHIRE MINED

HIGH GRADE QUALITIES

BARYTES

BARIUM SULPHATE 98-99%

ACID GRADE FLUORSPAR

CALCIUM FLUORIDE 98-99%

PRICES AND SAMPLES ON APPLICATION

Produced by :— DALES CHEMICALS LTD GRASSINGTON, YORKS

SOLE SELLING AGENTS

COLE & WILSON LTD

24 GREENHEAD ROAD, HUDDERSFIELD

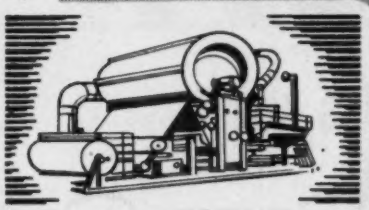
Telephone HUDDERSFIELD 1993 Telegrams COLOUR HUDD.

WORKS—Common Road Bay Hall Birkby Huddersfield Telephone Huddersfield 2499

THE ALUMINA Co. LTD.

MANUFACTURERS OF ALUMINIUM SULPHATE

FOR

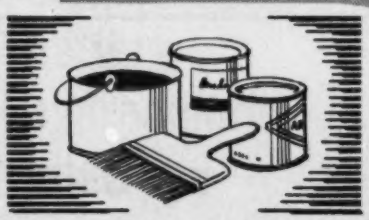


PAPER MAKING

FOR

WATER PURIFICATION

FOR



COLOUR MAKING

FOR

EFFLUENT TREATMENT

FOR

PHARMACEUTICALS

FOR

HORTICULTURE

The above are but a few of the main uses of ALUMINIUM SULPHATE
We should be pleased to supply further details on request

IRON BRIDGE WORKS · WIDNES

LANCASHIRE **Telephone: WIDNES 2275**

THE DORRCLONE

(Dutch State Mines Cyclone)

The DorrClone is a compact cylindroconical classification unit utilising centrifugal force in place of gravity. It provides a modern method of separating finely divided solids in liquid suspensions and constitutes an important new tool with which to supplement current practices in the Classification of crystalline and other granular suspensions.

The new TM3 15 mm. diam. Rubber and 10 mm. diam. Bakelite multi-DorrClones are now firmly established in the Starch field and are finding use in the Classification of Whiting, Clay, Pigment and Pharmaceutical particles in the Submicron size range.

DorrClones are also available singly or in multiple arrangements in 3 in., 6 in., 12 in. and 24 in. diameters.

DORR-OLIVER
COMPANY LIMITED

ASHFORD HOUSE, WILTON ROAD, (VICTORIA) LONDON, S.W.1

EXHAUSTERS
BLOWERS
BOOSTERS
COMPRESSORS

For Gases or Air

We have built all these throughout the present century, and before.

We know how to build them.

GEORGE WALLER & SON, LTD.
PHŒNIX IRON WORKS, STROUD, GLOS.

Telephone: Brimscombe 2301
Telegrams: Waller, Stone

COMMERCIAL AND PURE

ACIDS

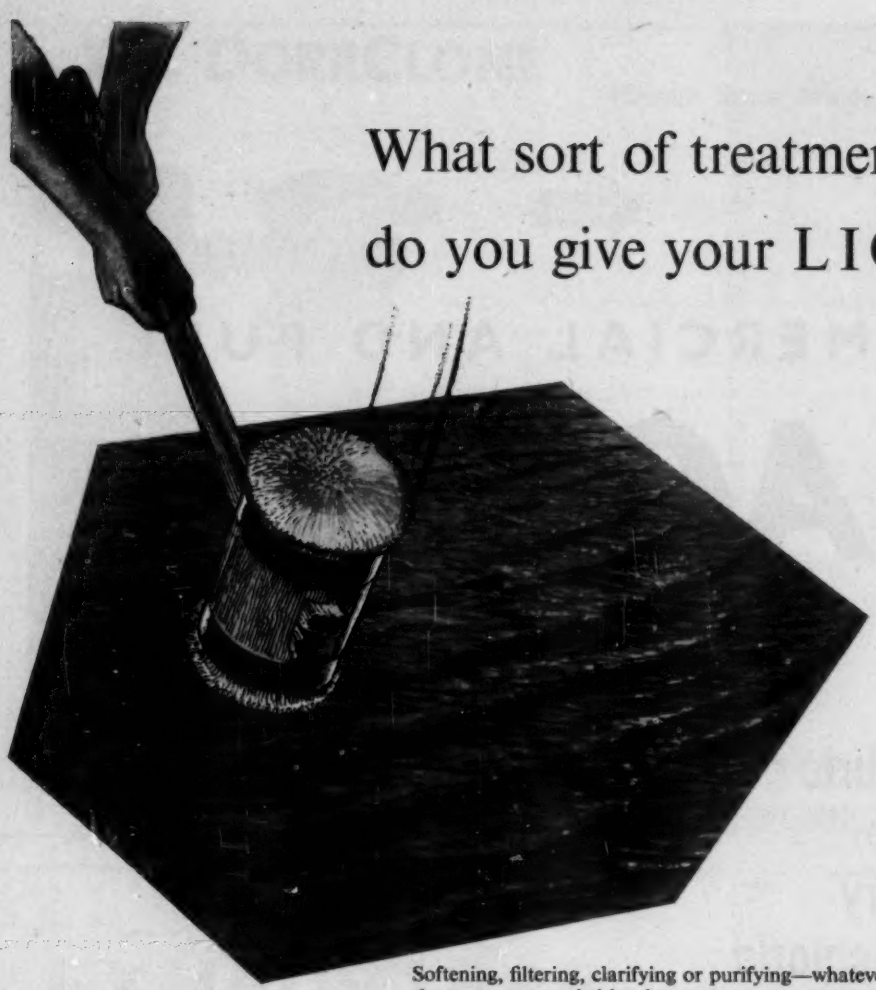
for all purposes

sulphuric
oleum
battery
hydrochloric
nitric
dipping
distilled water (pure)

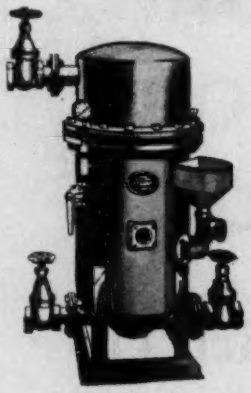
SCM BRAND

SPENCER CHAPMAN AND MESSEL LTD

45 PARK LANE · LONDON · W.1. Works Silvertown · E.16 Tel. GROSVENOR 4311 (4 lines)



What sort of treatment do you give your LIQUIDS?



Softening, filtering, clarifying or purifying—whatever the treatment needed by the water you use, you can rely upon Paterson plant to provide it. Plant that includes equipment for rapid gravity and pressure filtration, water softening systems of proved efficiency, and de-ionisation plant for producing water purer than obtainable from single distillation.

And for other liquids there is the Stellar Filter, providing fine filtration of essential oils, spirits, chemical solutions and water. Instant cleaning without dismantling or loss of liquid is only one of its many good points.

Small wonder Paterson plant is to be found in the many industries where supplies of pure water or filtered liquids are an essential part of the manufacturing process.

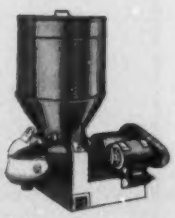
Whatever sort of treatment you want to give your liquids, have a word with Paterson about it first: over fifty years' experience has given them the answers to all your questions.

Paterson *for liquid treatment*

THE PATERSON ENGINEERING CO LTD · 103 WINDSOR HOUSE · KINGSWAY · LONDON WC2
TELEPHONE HOLBORN 8787

And this is the *Dry Feeder*.

Feeds powdered reagents and granular substances; feed adjustable in action.



Lubricant Sealed for a positive Shut-off

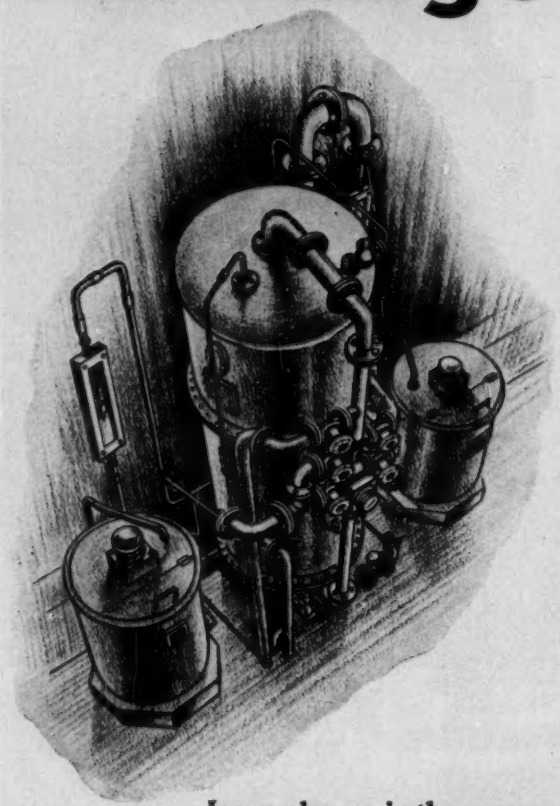
Longer service, life and lowest maintenance costs are characteristics of the Audco Valve with its pressurised lubricant system. A lubricant film forms a continuous and dependable seal and protects exposed surfaces against corrosive or erosive materials.
The valves are manufactured in a wide variety of materials to handle almost all fluids and gases with efficiency and economy.

Details supplied on request.

AUDCO VALVES

AUDLEY ENGINEERING CO. LTD · NEWPORT · SHROPSHIRE

Ion exchange



Ion exchange is the answer to all requirements for water of distilled quality

Typical plants employing various methods . . . . fully described in our literature available on request

NECKAR

NECKAR WATER SOFTENER CO. LTD.
Artillery Row, London, S.W.1

Kez-STRIP Conveyor
BELT BRUSH

Many materials, including nylon, hair and fibre or combinations, can be fitted in varying densities.

Just one of the many types of INDUSTRIAL Brushware made by

The Kleen-e-ze BRUSH CO., LTD
HANHAM BRISTOL

SACKS
AND
BAGS
for all purposes

ALWAYS IN STOCK AND READY FOR DELIVERY

CHARLES WALLIS & SONS (Sack's Ltd.)

HEAD OFFICE
90 CAMBERWELL ROAD
LONDON S.E.1

Telephone Rodney 3996
Telegrams Wallisacks, London, S.E.5

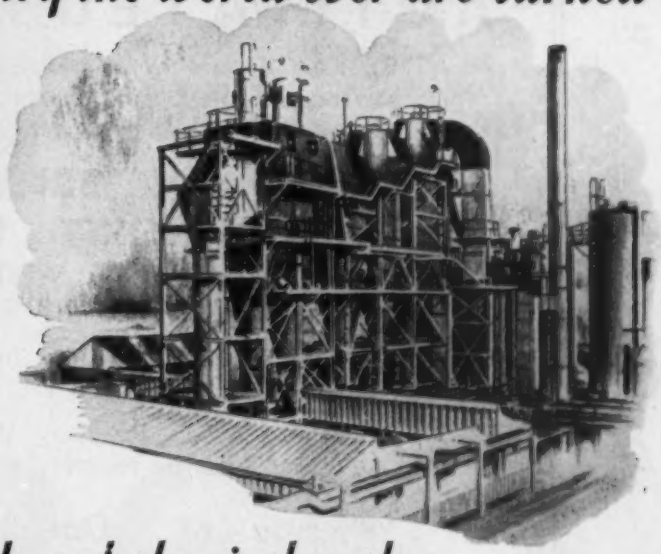
ALSO
MODEL FACTORY · OFFORD ROAD · SEVENOAKS · KENT
Telephone Sevenoaks 51659

Wheels of industry the world over are turned

by

B
T-H

ELECTRIC MOTORS



in the paint, varnish and chemical works

Whenever a power drive is needed, there is a BTH motor that will do the job efficiently and economically. In industries all over the world, BTH motors are helping to increase production. Over half-a-century's experience of this branch of electrical engineering enables BTH to offer the motor with the mounting, enclosure, rating and performance best suited to the application.

BTH factories are exceptionally well equipped to make both ***STANDARD*** *and* ***SPECIAL*** *machines in large quantities.*

Member of the AEI group of companies

THE
BRITISH THOMSON-HOUSTON
COMPANY LIMITED, RUGBY, ENGLAND

A4691

ULTRASORB
ACTIVATED CARBON

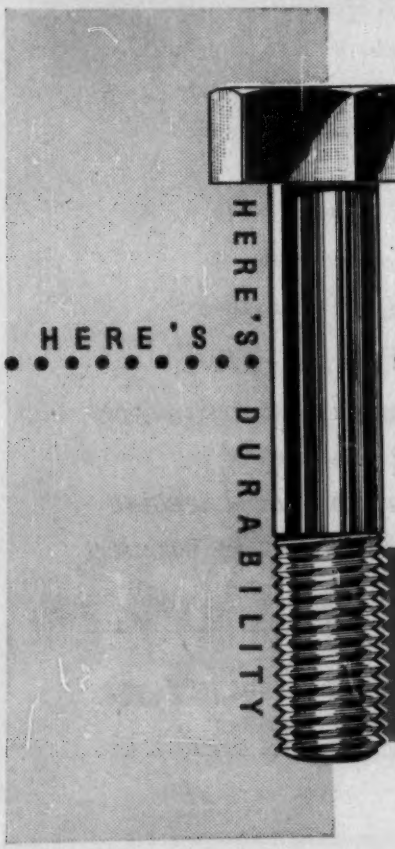
ULTRASORB carbons are available for recovery of most industrial solvents, benzole extraction, water purfication and other gas and liquid phase applications

BRITISH
CARBO NORIT UNION LIMITED
LONDON ROAD . WEST THURROCK . ESSEX
Telegrams: 'BRICARBUN GRAYS.' Telephone: GRAYS THURROCK 4845

CARBO-UNION-WHESSOE

Activated Carbon Recovery Plant for the purification of gases and the recovery of vapour phase solvents

Whessoe Ltd · Darlington · Co. Durham
Cables: Whessoe Darlington Telephone: Darlington 5315
LONDON OFFICE: 25 VICTORIA STREET, S.W.1.
ABBEY 3881



STAINLESS STEEL
BOLTS · NUTS · STUDS
ACID AND HEAT RESISTING

We are specialists in the manufacture of Bolts, Nuts, Studs and Machined Parts in all classes of Heat-Resisting and Stainless Steels.

THE **SANDIACRE SCREW Co LTD**
SANDIACRE • NEAR NOTTINGHAM
PHONE · SANDIACRE 2065/6 • GRAMS · SCREWS, SANDIACRE

All products are machined from bar materials.

extraordinary adhesion to metals

One of the many valuable properties of 'Araldite' epoxy surface coatings is extraordinary adhesion to metals. Other characteristics of these versatile resins include toughness combined with flexibility, abrasion resistance combined with the capacity to withstand moisture and chemical attack. These are some of the properties that account for the widespread and increasing employment of 'Araldite' epoxy resins for coating wires and the insides of collapsible tubes, for protecting food processing machinery as well as chemical plant and metal components exposed to severe conditions of use.

May we invite you to write *now* for full descriptive literature?

'Araldite' epoxy resins have a remarkable range of characteristics and uses

They are used

- **for bonding metals, porcelain, glass, etc.**
- **for casting high grade solid electrical insulation.**
- **for impregnating, potting or sealing electrical windings and components.**
- **for producing glass fibre laminates.**
- **for producing patterns, models, jigs and tools.**
- **as fillers for sheet metal work.**
- **as protective coatings for metal, wood and ceramic surfaces.**

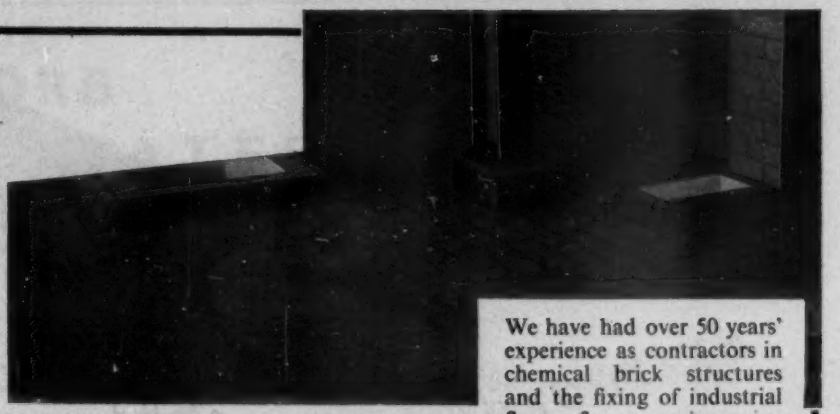
'Araldite' epoxy resins

'Araldite' is a registered trade name

Aero Research Limited *A Ciba Company. Duxford, Cambridge. Telephone: Sawston 2121*

AP.364-21

CONCRETE PROTECTION IN THE CHEMICAL INDUSTRY



★ *Write for descriptive literature*

We have had over 50 years' experience as contractors in chemical brick structures and the fixing of industrial floors for corrosive conditions.

We are also manufacturers of a full range of special duty cements for acid and alkali resistance.

F. HAWORTH (A.R.C.) LTD.
Ramsbottom LANCS

Phone : Ramsbottom 2067, 3079 Grams : 'CEMENTS' Ramsbottom
LONDON OFFICE: 40 BUCKINGHAM PALACE ROAD, S.W.1
Phone : Tate Gallery 3861

dm HW 5

A Personal Monitor for indicating the integrated doses of Gamma and Hard X-ray radiation received by an individual.

The accumulated radiation exposure is determined by holding the Dosimeter to the eye and viewing the position of an internal fibre on a graticule.

The C.K. Dosimeter is conveniently carried in the pocket, and two ranges are available ; 0 to 0.5r and 0 to 5r.

For further particulars of this instrument please write to :

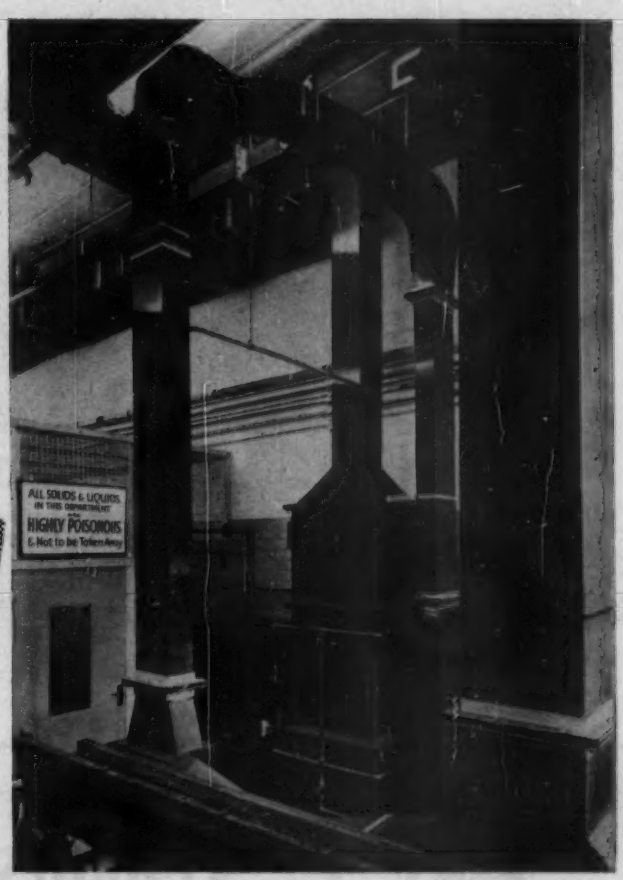
CINEMA-TELEVISION LIMITED

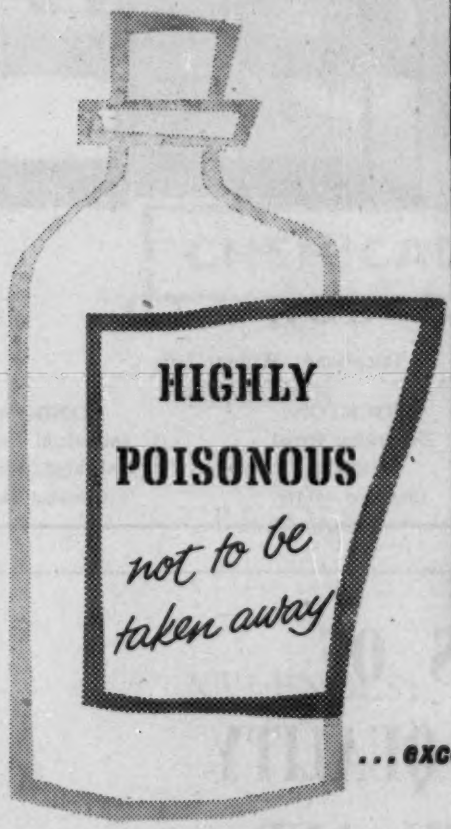
A Company within the Rank Organisation Ltd.

WORSLEY BRIDGE ROAD · LONDON · S.E.26

Telephone: HITher Green 4600

Absorption Towers and ducting made with Cobex sheet by Turner & Brown Ltd., and installed at the Blackburn factory of Mullards Ltd. Cobex rigid vinyl sheet by BX Plastics Ltd.





...except in Absorption Towers made with rigid

GEON PVC

Specially designed for the elimination of corrosive acid fumes, the "Turbro" Absorption Tower, with associated ducting, is one of many important applications for rigid Geon PVC in the chemical industry. The advantages of this versatile material are clear—

Long Life
Rigid Geon PVC withstands attack by most chemicals.

Ease of construction
Rigid Geon PVC is dimensionally stable... lends itself to precision engineering. Tough rigid sheets are softened by heat, shaped on formers, cooled and joined by hot-air welding.

Maintenance reduced
As colours run right "through" the sheet, there is no need for painting or any other surface treatment.

For further information about Geon PVC please write for descriptive booklet No. 113

Geon
Polyvinyl Materials

'Geon' is a reg'd trade mark

BRITISH GEON LIMITED

Sales and Technical Service

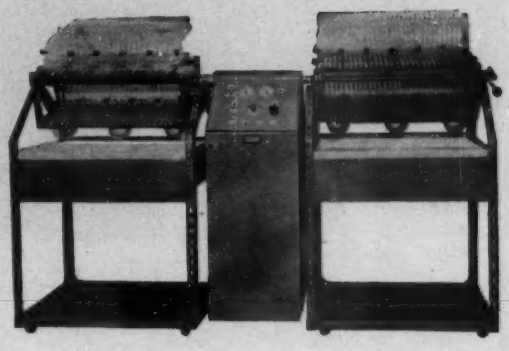
DEVONSHIRE HOUSE PICCADILLY LONDON W1 TELEPHONE: MAYFAIR 8867

Automatic Countercurrent Apparatus

Gilson-Wright Pattern

* Fully automatic operation. Variable shaking and settling times, automatic top-phase filling and predetermination of number of transfers up to 180.
* Independent robot drive coupled to stands carrying up to 200 countercurrent tubes.
* Countercurrent tubes, all glass, accurately matched and fused together in units which are interchangeable and fitted with ball and socket joints.
* Bottom-phase volumes of tubes accurate to within ± 2%.
* All stands accommodate countercurrent tubes with bottom-phase volumes ranging from 10ml. to 150ml.

May we send you full details?



J. W. TOWERS & CO., LTD.

Head Office and Works: WIDNES. Telephone: Widnes 2201

MANCHESTER:	LIVERPOOL:	STOCKTON:	LONDON:
44 Chapel Street	134 Brownlow Hill	28 Bridge Road	Industrial Estate
Salford 3	Liverpool 3	Stockton	Uxbridge, Middx.
(Blackfriars 2677)	(Royal 4074)	(Stockton 65141)	(Uxbridge 8461)

★ E-MIL

★ GREEN LINE

★ GOLD LINE

★ AMBER LINE

★ E-MILTEK

SYMBOLS OF FINEST QUALITY ACCURACY AND FUNCTIONAL DESIGN

First in LABORATORY GLASSWARE THERMOMETERS, and HYDROMETERS since 1914.

Catalogues on request.

REGISTERED TRADE MARKS OF

TO BE SURE SPECIFY E-MIL

H. J. ELLIOTT LTD

E-MIL WORKS TREFOREST INDUSTRIAL ESTATE PONTYPRIDD GLAMORGAN

Tel. Treforest 2555/7

UCC

CHEMICALS FROM COAL

PHENOL: 39.5/41°C

CRESOLS: 60/64% meta content
ortho, pure grade A

XYLENOLS: 1.3.5.
2.4/2.5
5/7°
(specified cuts as required)

Enquiries to:-

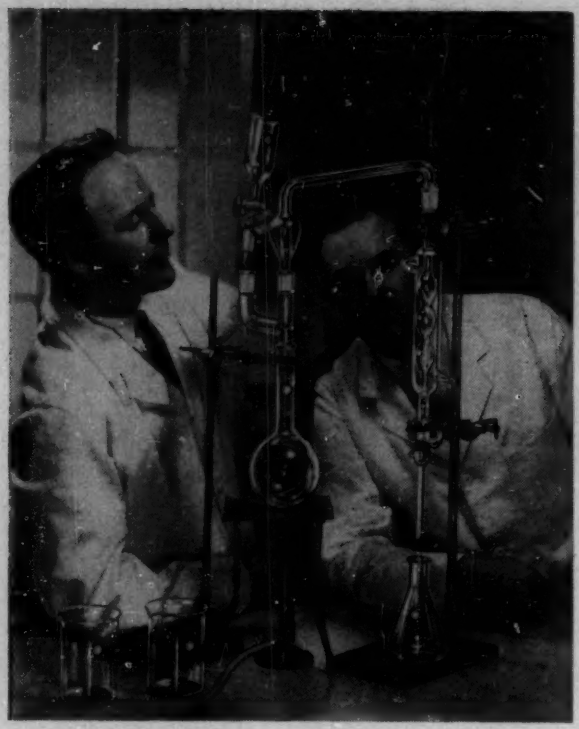
UNITED COKE & CHEMICALS COMPANY LTD.

(SALES DEPARTMENT 31) 34, Collegiate Crescent, Sheffield, 10

Telephone: Sheffield 63025 Telegrams: 'Unichem' Sheffield

THE UNITED STEEL COMPANIES LTD

UCC.1.



'PYREX' 'Grip-Seal' Joints simplify apparatus assembly ... are 100 per cent effective

The perfect-fitting qualities of 'Grip-Seal' Joints are due to the unique 'PYREX' method of manufacture, which ensures that every joint, both male and female, is ground and tested with micrometric precision.

Further, 'Grip-Seal' design results in stronger joints, with sturdier walls, more robust beadings, and sensible parallel gripping surfaces.

The logical result is, of course, that apparatus assembly is simplified, because every joint fits closely and securely, while the clamps hold the apparatus in a firm, safe grip.

Breakages in assembling and dismantling seldom occur, and expensive apparatus is thus safeguarded to give longer service.

That's typically 'PYREX' of course . . . one hundred per cent satisfaction.

● *A special section of the 'PYREX' catalogue deals with 'Grip-Seal' apparatus. If you would like a copy, please send your name, address and position in firm or organisation.*

MADE IN ENGLAND PYREX

'PYREX' REGD. TRADE MARK BRAND

PYREX GRIP-SEAL JOINT

THE BRITISH LABORATORY GLASSWARE

JAMES A JOBLING & CO LTD

Wear Glass Works Sunderland

THE ONLY MAKERS OF 'PYREX' BRAND GLASS IN THE UNITED KINGDOM

CROMIL & PIERCY LTD.

REGD. CROMIL

GRAPHITE IN ALL FORMS

MILBURN HOUSE
"E" FLOOR
NEWCASTLE-ON-TYNE
Tel.: 2-7761

The **Jefco**

FACE SCREEN

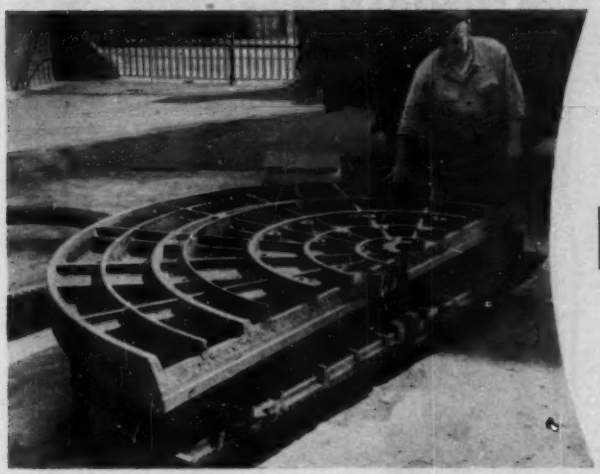
Reg. Design 751914 Patent applied for

Perfect protection when grinding or machining. Comfortable to wear, stands clear of the face, adjustable to any angle, non-splinter front easily renewable.

J. & E. FERRIS LTD

33 Museum St., London, W.C.1

REPAIRS ON SITE



•

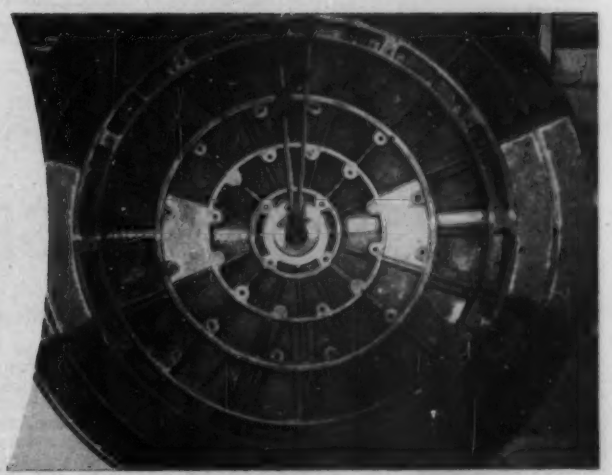
NO DISMANTLING

•

COLD REPAIRS

•

NO REASSEMBLING



•

ENQUIRIES TO:—

METALOCK (BRITAIN) LTD.

GRAND BUILDINGS · TRAFALGAR SQ · LONDON W.C.2

Tel : WHitehall 8902/5

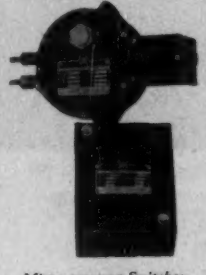
Cables : Metlokcast, Rand, London

LAPORTE CHEMICALS
FOR
industry

HYDROGEN PEROXIDE
SODIUM PERBORATE
ORGANIC PEROXY COMPOUNDS
BARIUM COMPOUNDS
SODIUM SULPHIDE
DETERGENTS

LAPORTE
Laporte Chemicals Ltd., Luton.
Telephone: Luton 4390. Telegrams: Laporte, Luton.

Diaphragm Pressure Switches


Micro-pressure Switches

KDG

A comprehensive range of
PRESSURE SWITCHES

FOR PETROLEUM - CHEMICAL & ALLIED INDUSTRIES *Some of the many applications*

Ranges 1" w.g. to 4,500 lbs. per sq. inch. Switches for gases and liquids with corrosion protection if necessary, and available with Flameproof enclosures. Certain types available for Differential Pressure and Flow monitoring. Slow moving contacts for precise action, or snap action for high current ratings. Relay and Ancillary Equipment, where necessary, can be supplied. High overload conditions, full adjustment and dial setting features available. Range also available as Dial Indicating Switches.

Full details and specifications supplied on request

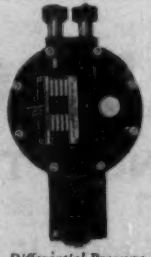
- Filter blockage
- Gas flow alarms
- Pressurization of conduit, etc.
- Compressor Control
- Forced Lubrication Alarm
- Hydraulic Accumulator Control
- Pneumatic Die or Chuck Protection
- Boiler Control
- Petroleum Refining
- Rubber Curing under Pressure
- Bottling Plant
- Diesel and other Power Plant

K.D.G. INSTRUMENTS LTD. MANOR ROYAL, CRAWLEY, SUSSEX. Crawley 25151.

Chemical Switches

Flameproof Pressure Switches

Liquid Level Switches


Differential Pressure Switches

Bourdon Pressure Switches

KARBATE

REGD. TRADE MARK

IMPERVIOUS GRAPHITE HEAT EXCHANGERS

COMPLETE CORROSION RESISTANCE

IMMUNITY TO THERMAL SHOCK

HIGH THERMAL CONDUCTIVITY

COMPACT ARRANGEMENT

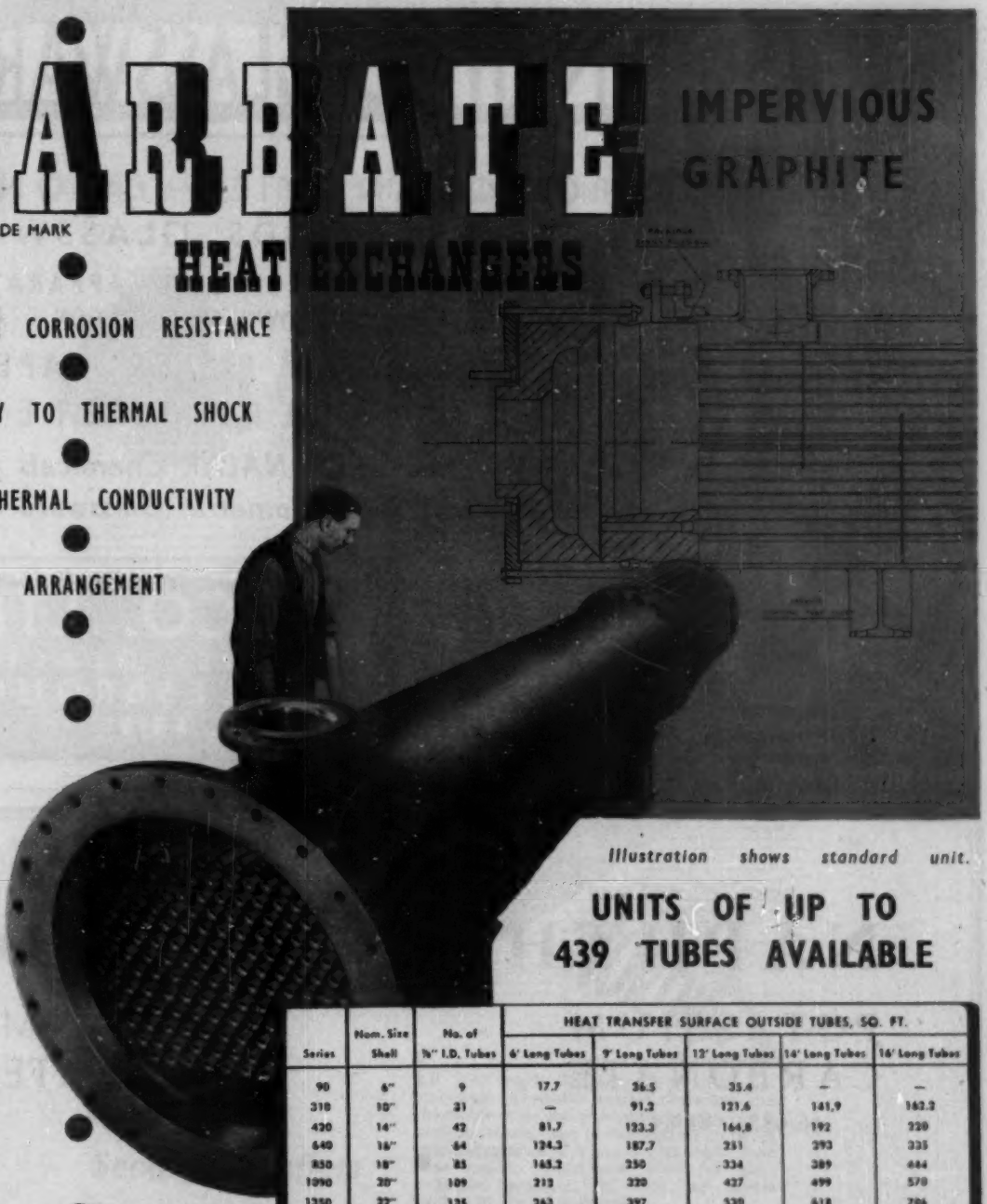


Illustration shows standard unit.

UNITS OF UP TO 439 TUBES AVAILABLE

Series	Nom. Size Shell	No. of ¾" I.D. Tubes	HEAT TRANSFER SURFACE OUTSIDE TUBES, SQ. FT.				
			6' Long Tubes	9' Long Tubes	12' Long Tubes	14' Long Tubes	16' Long Tubes
90	6"	9	17.7	26.5	35.4	–	–
310	10"	31	–	91.2	121.6	141.9	162.2
420	14"	42	81.7	123.3	164.8	192	220
640	16"	64	124.3	187.7	251	293	335
830	18"	85	165.2	250	334	389	444
1090	20"	109	212	320	427	499	570
1350	22"	135	263	397	530	618	706
1630	24"	163	317	479	640	746	853
1950	26"	195	379	573	766	892	1017
2330	28"	233	453	684	914	1166	1217
2680	30"	268	521	786	1051	1225	1400
3490	34"	349	679	1024	1368	1595	1822
4390	38"	439	855	1289	1722	2009	2295

BRITISH ACHESON ELECTRODES LTD

GRANGE MILL LANE · WINCOBANK · SHEFFIELD.

'Phone: ROTHERHAM 4836 (4 lines) 'Grams: 'ELECTRODES, SHEFFIELD'

BRITAIN'S LARGEST MANUFACTURERS OF GRAPHITE ELECTRODES & ANODES

SCIENTIFIC GLASSWARE

LARGE QUANTITIES of MONAX, PYREX and WOODS GLASSWARE

IN STOCK: SPECIAL APPARATUS MADE TO YOUR OWN SPECIFICATION - ALSO

BALANCES, FILTER PAPERS AND THERMOMETERS

Stockists for ANALAR Chemicals and E-mil Volumetric Glassware

MIDDLETON & CO. LTD.

SCIENTIFIC APPARATUS DEALERS

BOUNDARY ROAD, MIDDLESBROUGH

TELEPHONE: MIDDLESBROUGH 45191

NAPHTHENIC ACID

POTASSIUM CARBONATE

96/98% 83/85%

SODIUM CHLORATE

98/100%

•

Your enquiries welcomed by

W.E.X. TRADERS LTD.

1/11 HAY HILL · LONDON, W.1

HYDe Park 1206

TELEX LONDON 8262

"WIMPEXIM, TELEX"

IT'S PART OF THE NORTHIDE SERVICE

4 HAND SIZES – FIVE LENGTHS

IF your work demands gloves that give maximum protection against abrasions and chemicals—that are also harder wearing, yet comfortable and easy to keep clean—NORTH fabric-supported P.V.C. Gloves will meet your needs. There are types for most industrial processes, in sizes that assure perfect fit for all workers.
Call in Northide for Gloves in P.V.C., leather or cotton. Large stocks, quick deliveries—*it's part of the Northide Service.*

Send for Leaflets

describing P.V.C. Gloves, Garments, Headgear, etc., also Leather and Cotton Safety Gloves, Donkey Jackets and Safety Boots.

NORTHIDE LTD

IMPERVIA WORKS, QUEEN STREET, STOCKPORT, CHESHIRE. Tel.: STOCKPORT 2425 (2 lines)

Warehouses in Stockport, London and Birmingham

GLASS ENAMEL LINED
CHEMICAL PLANT

A Complete Plant
or a Single unit

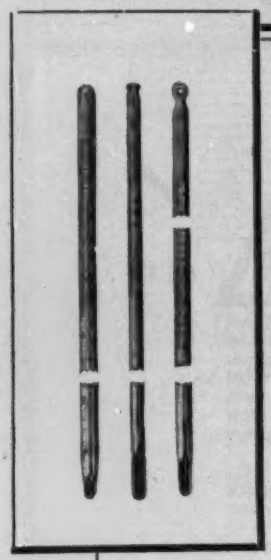
T. & C. CLARK & CO. LTD.
WOLVERHAMPTON

Grams: Clark, Wolverhampton. Tel: 20204/5

Illustrated are some of the range of high-grade well-packed inexpensive magnifiers manufactured by

GOWLLANDS LTD
MORLAND ROAD, CROYDON, SURREY

Obtainable from all scientific instrument dealers. Price list No. 163 available on request.

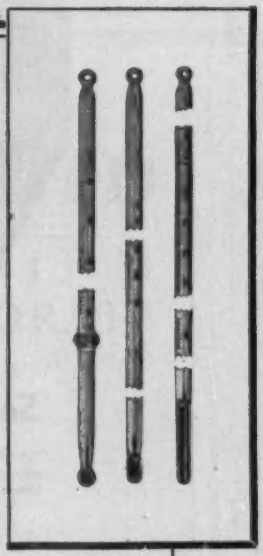


ZECOL

THERMOMETERS

CHEMICAL THERMOMETERS

HYDROMETERS

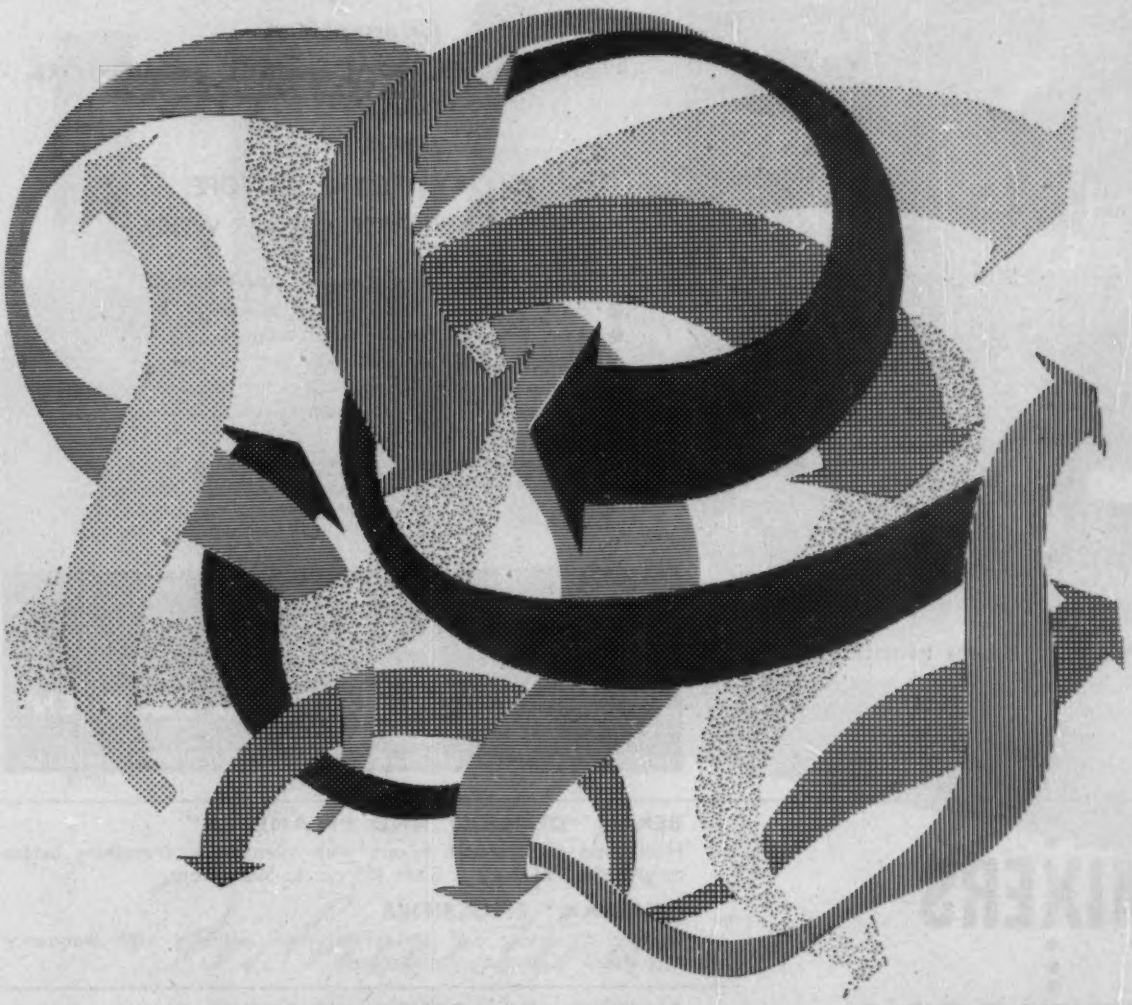


'PHONE LIBERTY 2283-6

G. H. ZEAL LTD.

'GRAMS ZEALDOM SOUPHONE LONDON

LOMBARD RD., MORDEN RD., MERTON, LONDON S.W.19



counter current processes

There are few processes in the chemical and allied industries which do not employ counter-current contacting of gas and liquid in one way or another.

We set ourselves out to offer the best designs and equipment that there is to accomplish such duties efficiently, both from the technical and cost standpoint.

Kittel plates and Spraypak tower packing are two of the most recently developed high efficiency, low cost instruments to do your job for you, and we invite you to submit your problems to us.

CJB

COSTAIN-JOHN BROWN LTD.

(CHEMICAL ENGINEERING DIVISION)

ROXBY PLACE · LONDON, S.W.6.

Telephone: FULham 7761

SLEE PLENUM ASSEMBLY AND WELDING EQUIPMENT.
REPRODUCED BY COURTESY OF HIVAC LTD.

OTHER PRODUCTS

MANUFACTURERS OF PRECISION SPOT WELDING MACHINES. ELECTRONIC TIMING GEAR. PROCESS CONTROLLERS. MAGNETISING EQUIPMENT. HIGH SPEED RELAYS AND CONTACTORS, ETC.

PLENUM EQUIPMENT

for assembly of

RADIO VALVES, MICROPHONES, TRANSISTORS, GYROSCOPES ETC. ETC.

AND ALSO FOR

EPOXY RESIN, ISOTOPE, AND BACTERIOLOGICAL WORK.

FEATURES

- Scientifically Designed and proportioned.
- Easy Clean Surfaces—all Steel Construction.
- Efficient Air System—Glass filter or Electrostatic.
- Working surfaces and windows to suit requirements
- Efficient illumination of working area.
- High Class Finish.
- Standardised unit construction.
- Wide range of complementary apparatus available, e.g. Dessicator Cabinets, Temperature controlled Storage Cupboards, Inspection Cubicles, etc. etc.

SLEE LONDON

SOUTH LONDON ELECTRICAL EQUIPMENT COMPANY LTD.

LANIER WORKS, HITHER GREEN LANE, LONDON, S.E.13. LEE GREEN 4814 5 6

MIXERS

GRINDERS

SEPARATORS & AIR CLASSIFIERS

DEGREASERS

BEKEN "DUPLEX" AND "PLANETEX"
Horizontal and vertical mixers with scientific intermeshing blades to give the TRUE mix. Sizes 155 c.c. to 500 gallons.

"TURRAX" EMULSIFIER
Unique dispersing and emulsifying unit utilising high frequency cavitation. German manufacture.

ALPINE "KOLLOPLEX", "CONTRAPLEX" AND "BIPLEX". Fine grinding and pulverising mills **"ROTOPLEX"** cutting mill. German manufacture.

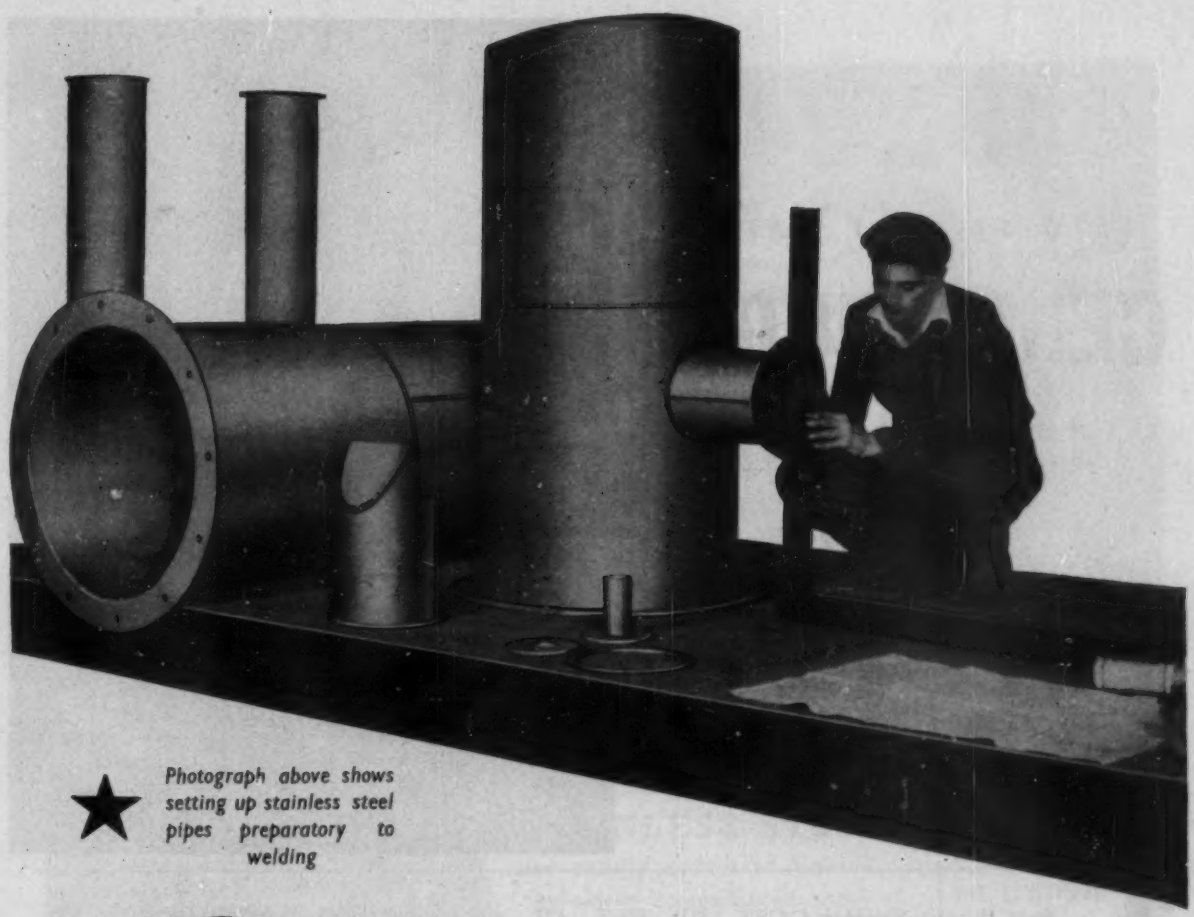
ALPINE "VENTOPLEX" AND "MIKROPLEX".
Air separators down to 2.5 micron fineness. German manufacture.

"FERMECO" rapid degreasers for unit or continuous degreasing.

Please write for details or arrange for confidential laboratory tests with your materials.

LAVINO (LONDON) LIMITED

GARRARD HOUSE, 31-45 GRESHAM STREET, LONDON, E.C.2. *'Phone:* MONarch 6137 *'Grams:* LAVINOLO, CENT, LONDON.



Photograph above shows setting up stainless steel pipes preparatory to welding

Fabrication in STAINLESS STEEL

Widnes Constructional Department is manned by a staff of highly skilled designers and erectors and is equipped for the production of Tanks for storage or mounting on road vehicles, High and Low Pressure Vessels, Adsorbers, Vertical Air Heater Shells, Crystallizers, Stills, Viscose Kettles etc. in Stainless steel.

ESTABLISHED 1841

WIDNES FOUNDRY & ENGINEERING Co LTD

LUGSDALE ROAD · WIDNES · LANCS

TELEPHONE: WIDNES 2251/4 TELEGRAMS: "FOUNDRY WIDNES

W-44

48 x 24

ELECTRICALLY DRIVEN

CENTRIFUGAL

★ Cast iron framing.

★ Copper perforated and hooped basket with bronze centre.

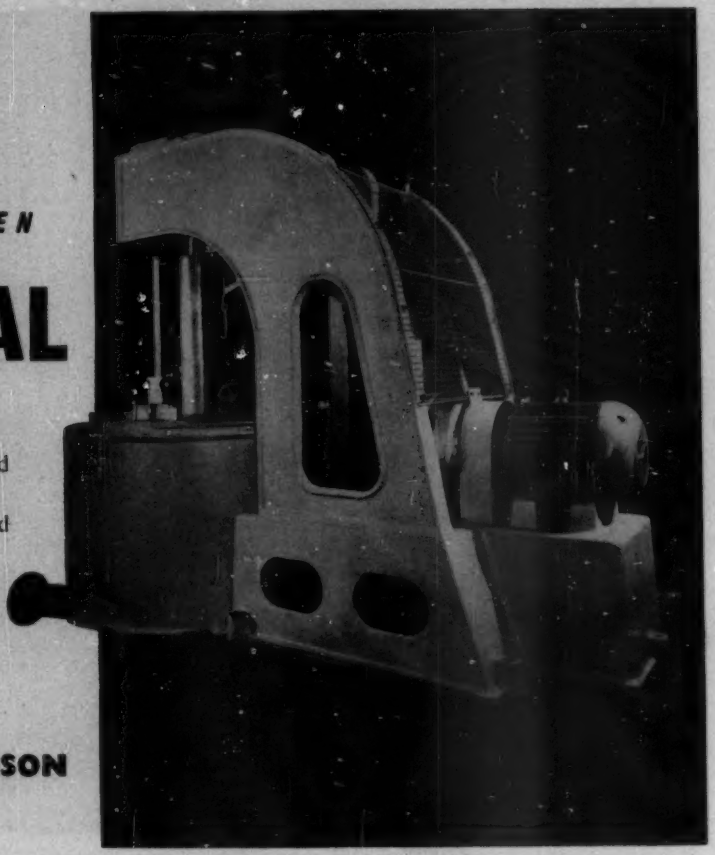
★ Copper sheathed spindle and copper safety cover.

★ Mechanical plough with counter balance weight.

★ Scoop controlled fluid coupling.

★ Totally enclosed electric motor.

POTT, CASSELS & WILLIAMSON
MOTHERWELL, SCOTLAND

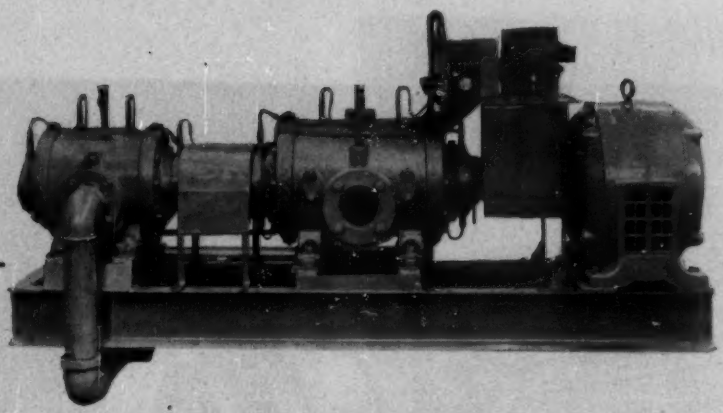


Fast Bases: Scarlet GGSL, RL, RCL, GL, GCL, GGL; Red BL, Red KBL, GL, GGL, 3GL, RL; Garnet GBL, GBCL; Orange GRL; Yellow GCL

LEITCH **Chemicals for Colour**

John W. Leitch & Co. Ltd. Milnsbridge near Huddersfield

put it to the test!
These new pumps open up an extensive range of acids, alkalis and slurries to economical pumping. They are constructed in 18/8/3 Stainless Steel for mildly corrosive liquids or in WORTHITE, a super-resistance alloy steel enabling Sulphuric Acid to be pumped with negligible corrosion loss. Also, there is the added advantage of easy interchangeability of the Stuffing Box Packing with two types of Mechanical Seal to suit different processes—plus the embodiment of the well-known Worthington-Simpson "Monobloc" construction which means few parts, lower costs, less wear and easier installation.
MONOBLOC CONSTRUCTION
with all affected parts in
18/8/3
STAINLESS STEEL
for mildly corrosive liquids or where contamination and discolouration of the liquid must be avoided
WRITE FOR SPECIMEN 1½" DISCS AND TEST THESE MATERIALS UNDER YOUR OWN SITE CONDITIONS
ALSO AVAILABLE IN 'WORTHITE'
a new alloy steel with exceptional resistance to many acids, alkalis and slurries
WORTHINGTON - SIMPSON
CHEMICAL PUMPS
A WIDE RANGE AVAILABLE
WORTHINGTON-SIMPSON LIMITED NEWARK NOTTS



HOLLAND-S. L. M.

ROTARY COMPRESSORS AND VACUUM PUMPS

LOW MAINTENANCE COSTS · LONG LIFE
INITIAL EFFICIENCIES MAINTAINED OVER YEARS OF SERVICE

The B. A. Holland Engineering Co. Ltd.

15, DARTMOUTH STREET, LONDON, S.W.1.

Telephone : WHI 2823. Telegrams : Picturable, Phone, London. Works : SLOUGH, BUCKS.

ACTIBON

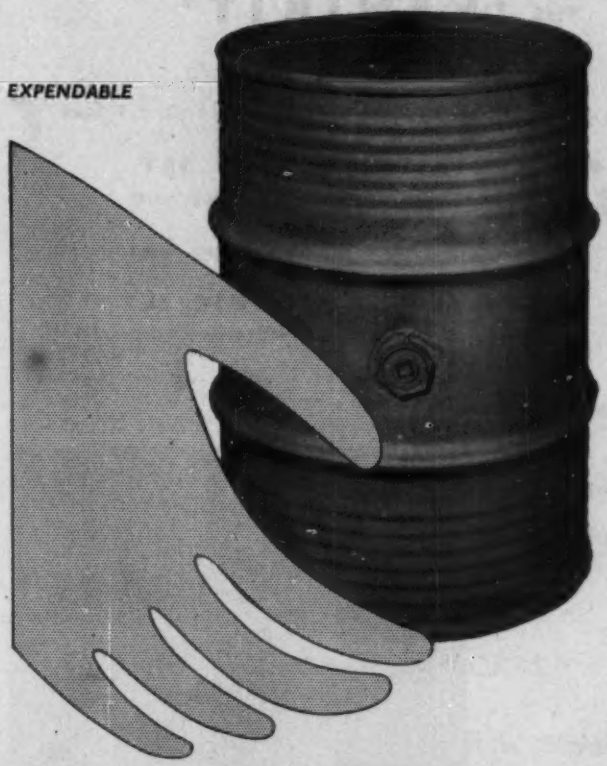
. . . the highly activated Carbon for ALL Decolourising purposes

THE CLYDESDALE CHEMICAL CO. LTD.

142 QUEEN STREET · GLASGOW C.1

Phone: CENtral 5247/8
Grams: "Cactus" Glasgow

EXPENDABLE



safer handling . . .

RETURNABLE

with **Braby** (regd.) steel drums

These drums are available in a wide range of types in Returnable and Non-Returnable forms. All types can be supplied with painted exteriors whilst some may be decorated in colour suitable for the application of Users' names, trade marks, etc. Other finishes include galvanized, tin or lacquer lined.

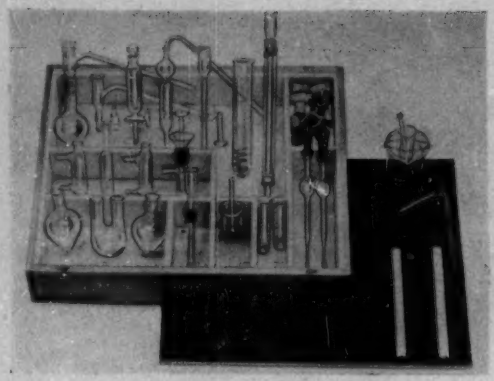
ONE OF THE WIDE RANGE OF BRABY PRODUCTS

FREDERICK BRABY & COMPANY LIMITED

HAVELOCK WORKS, AINTREE, LIVERPOOL, 10. TELEPHONE: AINTREE 1721

OTHER FACTORIES AT: London Works, Thames Road, Crayford, Kent. TELEPHONE: Bexleyheath 7777
Eclipse Works, Petershill Road, Glasgow, N. TELEPHONE: Springburn 5131
Ashton Gate Works, Bristol, 3. TELEPHONE: 64041. And Falkirk

OTHER OFFICES: 352-364 Euston Road, London, N.W.1 (Head Office). TELEPHONE: EUSton 3456
110 Cannon Street, London, E.C.4 (Export). TELEPHONE: MANsion House 6034
Queen's Buildings, 10 Royal Avenue, Belfast. TELEPHONE: 26509
Palace Street, Plymouth. TELEPHONE: 62261



THE 'KEMIKIT'

to the revised designs of
Dr. J. T. Stock and Mr. M. A. Fill, F.R.I.C.

As demonstrated at the University of Connecticut by Dr. J. T. Stock

← **'KEMIKIT' ORGANIC SET**
Complete as illustrated **£4. 18s. 6d.** *(postage extra)*

Small-scale methods improve technique - cut costs - save time

'KEMIKIT' INORGANIC SET
Complete as illustrated **£1. 9s. 6d.** *(postage extra)*

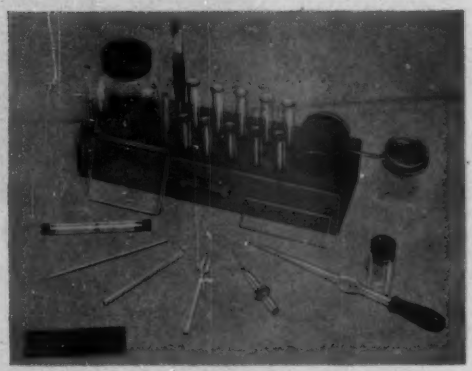
↓

ALL INDIVIDUAL PARTS OBTAINABLE SEPARATELY · **SEND FOR LISTS**

Text books are available as used with this apparatus in the regular courses held at Norwood Technical College, London

'INTRODUCTION TO ORGANIC CHEMISTRY'
(Stock and Fill)
Price **7s. 6d.**
Postage 8d.

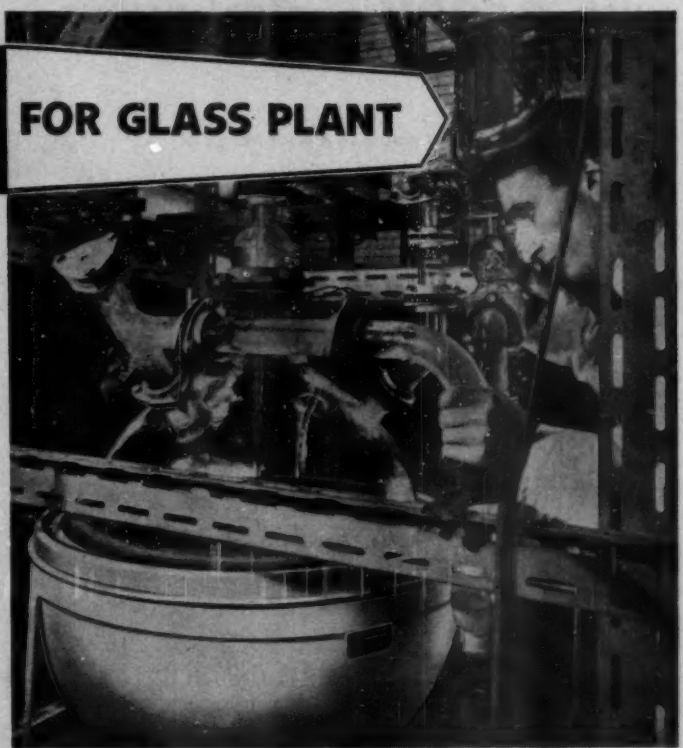
'INORGANIC QUALITATIVE ANALYSIS'
(Stock and Heath)
Price **5s. 0d.**
Postage 8d.



AIMER PRODUCTS LTD.
SCIENTIFIC & INDUSTRIAL GLASSBLOWERS & EQUIPMENT
56-58 ROCHESTER PLACE, CAMDEN ROAD, LONDON N.W.1.
Telephone : GULLIVER 3618

Isomantles FOR GLASS PLANT

in the
PROCESS DEVELOPMENT OF
BARBITURATES
at Geigy MANCHESTER



Electric heating by ISOMANTLES ensures precise control and a perfect product at Messrs. Geigy's and many other famous works. Available for all standard glass flasks and metal plant up to 2,000 gallon capacity.

12 months' guarantee. Special construction for flameproof areas carrying 3 years' guarantee.

Do let us help you with your heating problems—preferably at the design stage. And ask for latest leaflets.

Isopad Ltd.

Now at our new factory : **STIRLING CORNER, BARNET BY-PASS, BOREHAM WOOD, HERTS.** **Phone : ELStree 2817-9**

T . DRYDEN . LTD

COMPLETE LABORATORY FURNISHERS

CHEMICALS & ACIDS FOR LABORATORY AND INDUSTRIAL PURPOSES

SCIENTIFIC GLASSWARE AND APPARATUS
THERMOMETERS, HIGH CLASS FURNISHING
PHOTOGRAPHIC CHEMICALS & EQUIPMENT

SOUTH WALES STOCKIST AND DISTRIBUTOR OF

PYREX, MONAX and FIRMASIL GLASSWARE.
WHATMAN, POSTLIP and GREEN'S FILTER PAPERS.
BAIRD & TATLOCK'S APPARATUS.
ROYAL WORCESTER PORCELAIN.
A. GALLENKAMP'S SPECIALITIES.
FIRECLAY and VITREOSIL WARE.
OERTLING & STANTON BALANCES.
"ANALAR" ACIDS and CHEMICALS.
BRITISH ROTOTHERM TEMPERATURE GAUGES.
E-MIL VOLUMETRIC GLASSWARE and THERMOMETERS.

LANDORE SWANSEA

TELEPHONE : **SWANSEA 55844/5**

the twelve labours

The fourth of the Herculean tasks—the killing of the lion that was terrorising the peasantry of Argolis, called for anticipation and resource rather than brute strength.
Hercules awaited the lion's attack and using a wrestlers' 'throw' put the beast on its back, promptly throttled it and removed its arrow- and spear-resisting skin.
Hercules thereafter always wore the skin which became a symbol of his strength and dependability.

DEPENDABILITY IS THE KEYNOTE IN **STAVELEY** CHEMICALS FOR INDUSTRY

THE STAVELEY IRON & CHEMICAL CO LTD near CHESTERFIELD

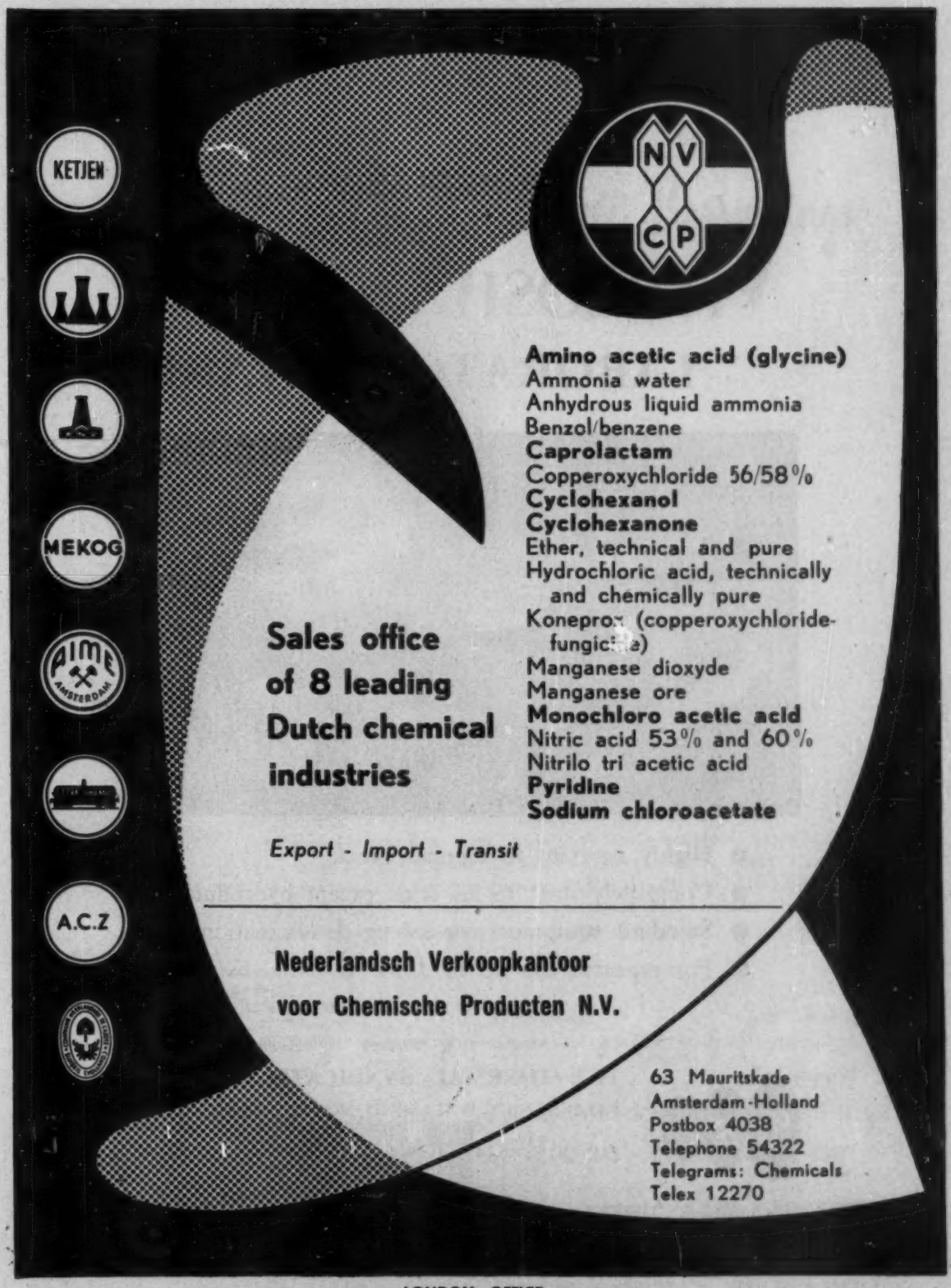
For some of the newer products in this Chemical Age consult the latest supplementary lists of

LIGHT'S ORGANIC CHEMICALS

Write for your copy

L. LIGHT & CO. LIMITED

POYLE · COLNBROOK · BUCKS



LONDON OFFICE:

GREYER, BRECHEISEN & CO., LTD.

BUSH LANE HOUSE, CANNON STREET, LONDON, E.C.4.

the twelve labours

The fourth of the Herculean tasks—the killing of the lion that was terrorising the peasantry of Argolis, called for anticipation and resource rather than brute strength.

Hercules awaited the lion's attack and using a wrestlers' 'throw' put the beast on its back, promptly throttled it and removed its arrow- and spear-resisting skin.

Hercules thereafter always wore the skin which became a symbol of his strength and dependability.

DEPENDABILITY IS THE KEYNOTE IN STAVELEY CHEMICALS FOR INDUSTRY

THE STAVELEY IRON & CHEMICAL CO LTD near CHESTERFIELD

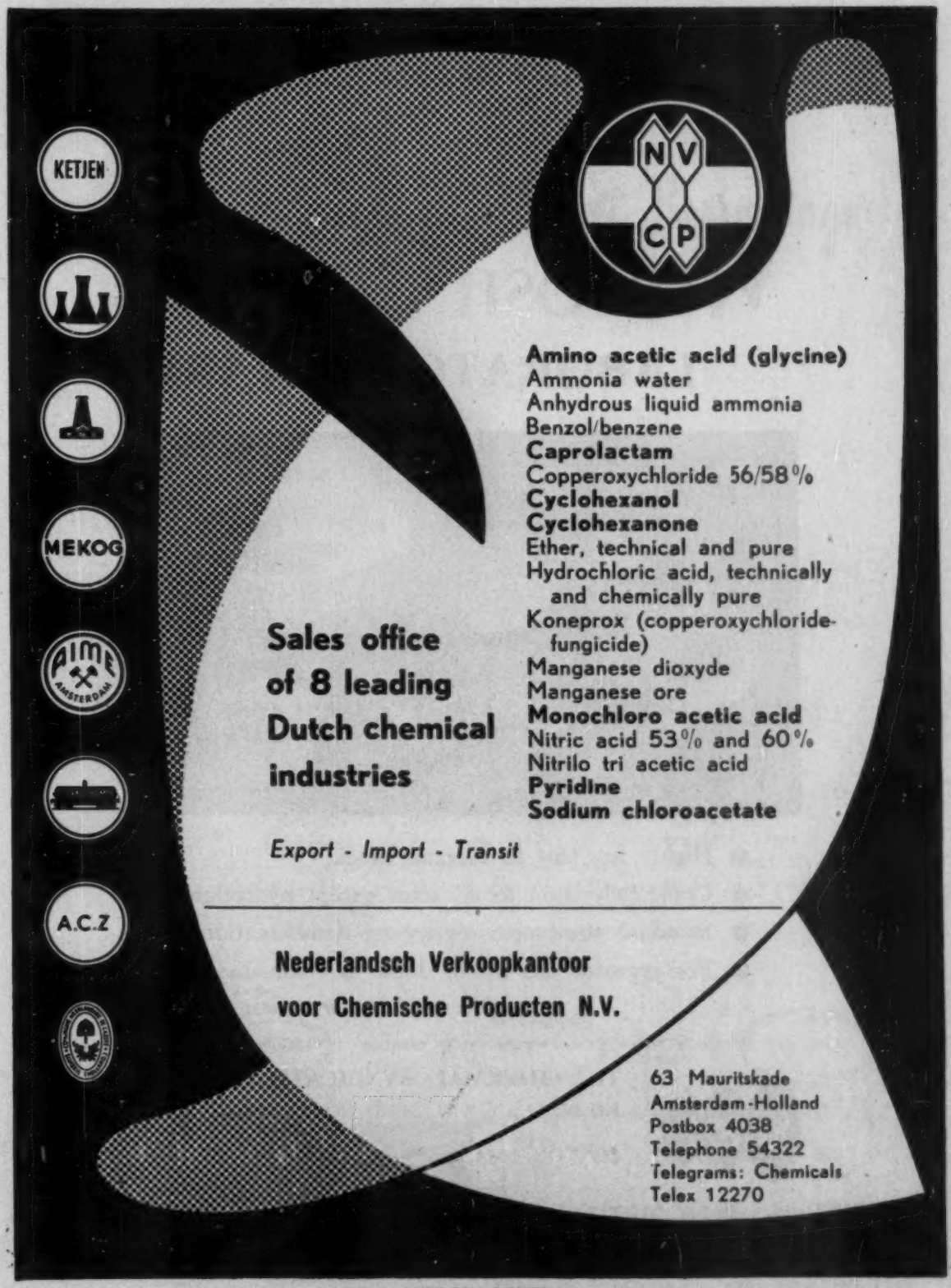
For some of the newer products in this Chemical Age consult the latest supplementary lists of

LIGHT'S ORGANIC CHEMICALS

Write for your copy

L. LIGHT & CO. LIMITED

POYLE · COLNBROOK · BUCKS



LONDON OFFICE:

GREYER, BRECHEISEN & CO., LTD.

BUSH LANE HOUSE, CANNON STREET, LONDON, E.C.4.

VITREOSIL *pure fused silica*
LABORATORY WARE

- Highly resistant to thermal shock.
- Completely inert to all acids except hydrofluoric.
- Standard equipment for ashing determinations.
- For repeated use up to 1050° C.

Leaflets available on request.

We also manufacture an extensive range of Vitriosil Industrial Ware

THE THERMAL SYNDICATE LIMITED

P.O. BOX No. 6, WALLSEND, NORTHUMBERLAND
Telephone: Wallsend 63242

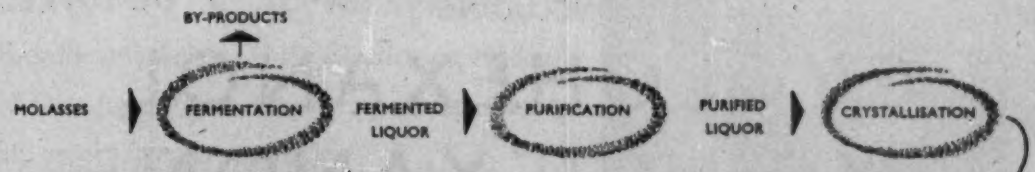
LONDON: 12-14 OLD PYE STREET, WESTMINSTER S.W.1
Telephone: ABBey 5469

FINE CITRIC ACID IN THE MAKING

Sweet Beginnings

In considering Industry as Patron of the Arts, our new artist's attempt to illustrate the first stage in citric acid production is as irrevelant as it is original. That is what comes of mixing art with molasses, which is admittedly sweet — very sweet and also undeniably the beginning of the present Sturge Citric Acid story. But molasses has not always been the raw material of citric acid.

Formerly the industry relied entirely on imports of lemon juice and citrate of lime from Italy, but in 1930 Sturge introduced a new process for producing chemicals on a commercial scale by mould fermentation. This Sturge fermentation plant was the first of its kind to be operated in this country and finally enabled a by-product of home-grown sugar beet to replace imported materials.



Manufacturers of fine chemicals since 1823

STURGE

CITRIC ACID BP

CITRIC ACID ANHYDROUS

JOHN & E. STURGE LTD · WHEELEYS RD · BIRMINGHAM, 15 · TEL: MIDLAND 1236

TGA. CA6

Ladies are to be admitted

"The 'Female Physicians' question, thanks to Professor Masson, has made a great stride during the past week. Ladies are to be admitted to study Medicine at Edinburgh University. Imagine the feelings of the non-contents when Professor Masson, in a final outburst, described their argumentation as 'rampageous mysticism, dashed with drivel from Anacreon!'" (*Nature, 1869, 1, i, 25*)

In 1869 scientific clinical methods were nearly as unpopular as women doctors. Today men and women work together in clinical, bacteriological and pathological laboratories all over the world; and in more than seventy countries regard the products of the B.D.H. Laboratory Chemicals Group with equal favour.

B.D.H. LABORATORY CHEMICALS

THE BRITISH DRUG HOUSES LTD. B.D.H. LABORATORY CHEMICALS GROUP POOLE DORSET

LC/P/13at

BRITISH TAR PRODUCTS
LIMITED

MAKERS OF

HYDROGENATED SOLVENTS

INCLUDING

CYCLOHEXANOL

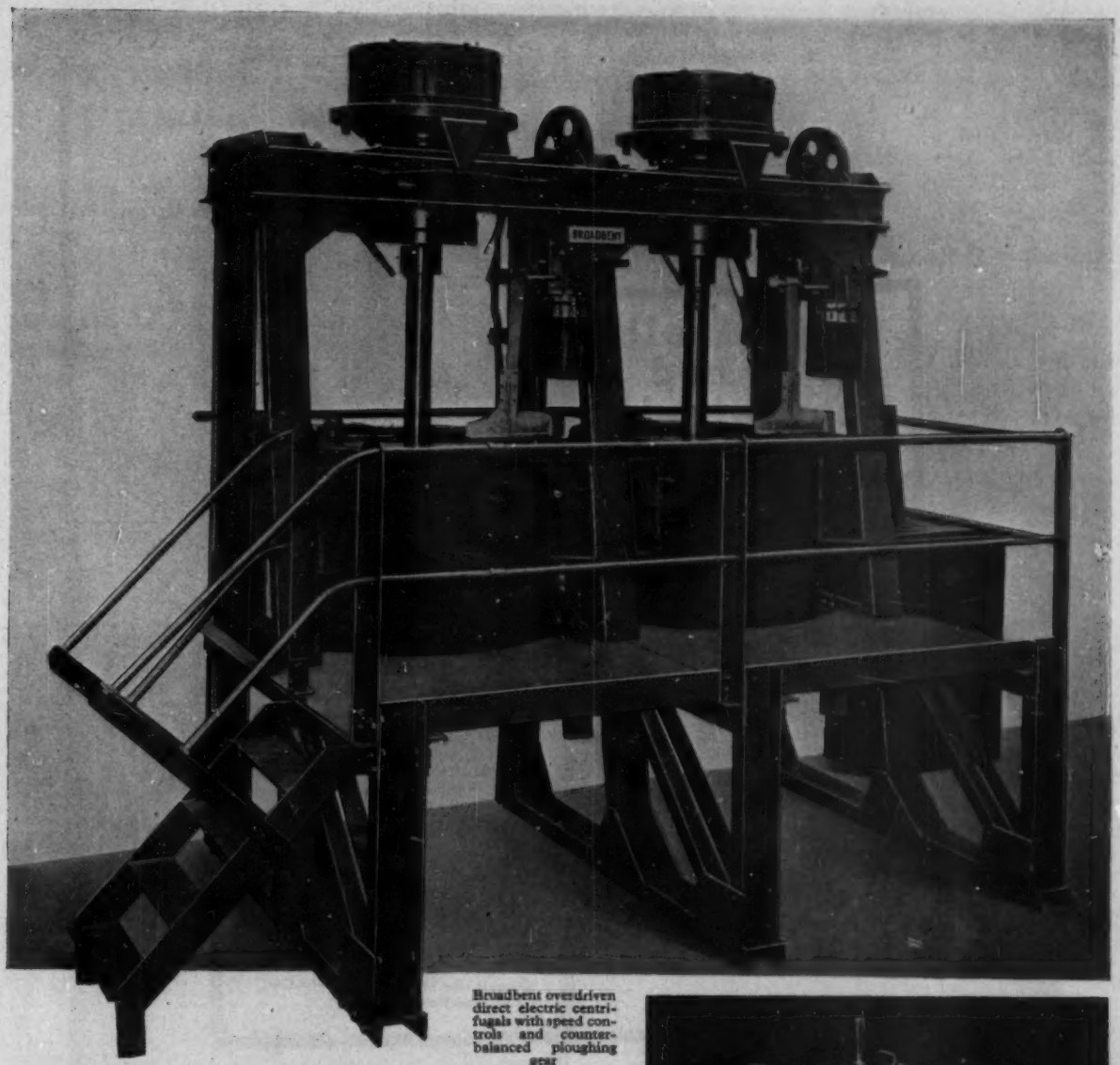
CYCLOHEXANONE

METHYLCYCLOHEXANOLS

SALES OFFICE

418A GLOSSOP ROAD · SHEFFIELD 10

Telephone: 60078-9 *Grams:* "Cresol, Sheffield 10"



Broadbent overdriven direct electric centrifugals with speed controls and counterbalanced ploughing gear

CENTRIFUGAL SEPARATION

Broadbents specialise in the effective application of centrifugal force wherever separating, filtering or clarifying is required.

High speed centrifugals with rapid acceleration ensure drier solids and clearer liquors with shorter cycles and increased profits.

Broadbent 21" type 86 centrifugal with an interchangeable basket and outercasing

Consult the centrifugal specialists—

THOMAS BROADBENT & SONS LTD

CENTRAL IRONWORKS HUDDERSFIELD

Phone 5520/5 Grams 'BROADBENT' Huddersfield

Individually Planned Laboratories

designed for your requirements

Our modern laboratories are individually planned and designed for their particular purposes in Research, Industry, Education and Medicine: they can also be planned with a view to future rearrangements. Sixty years widespread experience enables us to offer suggestions and designs based on the best of present-day developments.

Laboratories recently equipped by us.

- Research and Routine . . . . . Petrochemicals Ltd., Manchester
- Botany and Physics . . . University College, London.
- Pathological . . . Radcliffe Infirmary Oxford.
- Routine . . . . . May and Baker, Dagenham.
- Research and Routine . . . International Chemical Co. London.
- Chemistry and Physics . . . University College, Hull.

Consult our Technical Department without obligation.

CHARLES HEARSON
& Co. Ltd.
Laboratory furnishers & apparatus manufacturers
68 WILLOW WALK, BERMONDSEY, LONDON, S.E.1.
Telephone: BERmondsey 4494 (4 lines)

VOL. LXXVII No. 1957
12 JANUARY 1957

The international weekly chemical journal covering every aspect of industrial chemistry and chemical engineering

OVERSEAS AGENTS

Argentina, Inter-Prensa, Florida 229, Buenos Aires • **Australia,** L. M. Cullen & Co. Pty. Ltd., 12 Howard Street, Perth. Gordon & Gotch (Australasia) Ltd., 262-264 Adelaide Street, Brisbane, Queensland. The Grahame Book Co., 39-49 Martin Place, Sydney, N.S.W. John Hinto & Co., 164 Pitt Street, Sydney, N.S.W. Jarvis Manton Pty. Ltd., 190 Bourke Street, Melbourne C1. N.S.W. Bookstall Co. Pty. Ltd., Cnr. Market & Castlereagh Streets, Sydney, N.S.W. • **Belgium,** W. H. Smith & Son Ltd., 71-75 Boulevard Adolphe Max, Brussels • **Brazil,** Livraria Stark Ltda., Caixa Postal 2786, Sao Paulo • **British West Indies,** Christopher B. Hills, 101-103 Harbour Street, Kingston, Jamaica • **Canada,** W. H. Smith & Son (Canada) Ltd., 224 Yonge Street, Toronto • **Ceylon,** The City Stores Ltd., Kandy. The Lake House Bookshop, McCallum Road 10, Colombo • **Chile,** The E. S. Blair Company, Bandera 172-80 Piso Ofa 14, Santiago, Chile. • **Cyprus,** The Union Trading Co., P.O. Box 123, Larnaca • **Czechoslovakia,** Artia Ltd., 30 Ve Smeckach, Prague II • **Denmark,** Illustrated News Service, Dahlerupsgade 1, Copenhagen V • **Egypt,** S. S. Bassous, P.O. Box 109, Alexandria • **Finland,** Akateeminen Kirjakauppa, Helsinki. Rautatiekirjakauppa Oy., Helsinki • **Fiji,** A. A. Shameem & Co., P.O. Box 8, Suva • **France,** Paul Crampel, 54 rue Rene Boulanger, Paris X • **Germany,** Buch und Zeitschriften-Union, Harvestehuder Weg 5, Hamburg 13. W. E. Saarbach G.m.b.H., 30, Gertrudenstrasse, Cologne 1 • **Holland,** Dekker en Nordemann's Wetenschappelijke Boekhandel N.V., O.Z. Voorburgwal 243, Amsterdam C. Meulenhoff & Co. N.V., 2-4 Beulingstraat, Amsterdam • **Hong Kong,** F. E. Skinner (Hong Kong) Ltd., P.O. Box 1066, Hong Kong • **India,** Bivar & Co., 11 Maharaja Tagore Road, Calcutta 31. J. M. Jaina & Bros., Mori Gate, Delhi. Manufacturers' Eastern Agency, P.O. Box 301, 105 Apollo St., Bombay. L. V. Paramesh, 32 T.S.V. Kovil Street, Mylapore, Madras, 4. • **Indonesia,** Meulenhoff & Co., N.V., 2-4 Beulingstraat Amsterdam, Holland • **Israel,** The Collective Subscription Agency, P.O. Box 768, Haifa • **Italy,** Intercontinental S.R.L., Via Edolo 27, Milan. Messaggerie Italiane S.p.A., Via Lomazzo 52, Milan • **Japan,** Maruzen Co. Ltd., 6 Tori-Nichome, Nihonbashi, Tokyo. Overseas Publications, Ltd., Central P.O. Box 1582, Tokyo • **Malaya,** City Book Store Ltd., Winchester House, Collyer Quay, Singapore • **Malta,** Allied Malta Newspapers, Ltd., Strickland House, 341 St. Paul Street, Valetta. Lewis Gauci, 71 St. Mary Street, Sliema • **Mauritius,** E. Dawood Ltd., P.O. Box 27, Port Louis • **Mexico,** The Crane Agency, Ave. 16 de Septiembre No. 6 Desp. 402, Mexico, D.F. • **New Zealand,** N. Hamilton Baker, G.P.O. Box 721, Wellington. R. Hill & Son, Ltd., Plaza Building, 236 Queen Street, Auckland C.1 • **Nigeria,** Goodwill Trading Co., Kemta-Okebode, Abeokuta • **Norway,** A/S Narvesens Kioskkompani, Stortingsgata 2, Oslo • **Pakistan,** Danishmand & Co., Karkhana Bazar, Lyallpur, W. Punjab. Seafar Agencies, opp. Grindlays Bank Ltd., Bunder Road, Karachi 2 • **Paraguay,** Representaciones Reutar, Calle Palma 308, Asuncion • **Persia,** Vitab Commercial Establishment, 1856 Ave. Hafez, Tehran **Rhodesia & Nyasaland, Federation of,** V. W. Van Rijnberk, P.O. Box 238, Bulawayo, S. Rhodesia • **Salvador,** Antonio Garcia, 5a Calle Orient No. 75 San Salvador • **South Africa,** Technical Books (Pty.) Ltd., P.O. Box 2866, Cape Town • **Spain,** Distribuidora Internacional Soc. Ltda., Duque De Sexto, 36, Madrid • **Sweden,** Wennergren-Williams A/B, Box 657, Stockholm • **Switzerland,** Dr. H. R. Conrad, Rehmatt, Meilen, Nr. Zurich • **Syria,** F. H. Tcheleby, P.O. Box 225, Alappo • **Turkey,** H. C. Hornstein, 1480 inci Sok. No. 12, Alsancak, Izmir • **U.S.A.,** British Publications Inc., 30 East 60th Street, New York 22 • American News Co. Inc., 131 Varick Street, New York 13. Moore-Cottrell Subscription Agency, North Cohocton, New York • **Uruguay,** Liberialng less Ltda., Sarandi 530, Montevideo • **Venezuela,** Distribuidora Santiago C.A., Apartado 2589, Caracas.

THE CHEMICAL AGE

NEWS of the WEEK

Economic Summary 1956	75
Pictures of the Year	77
Greetings from the Chemical Trade Leaders	78
West German Chemical Review	83
More Pictures of the Year	84
Note & Comment	85
Diary Dates	86
Chemical Pioneers—I. John Roebuck	87
People in the News	88
Instrumentation in the Chemical Industry	90
Indian Newsletter	93
From All Quarters	94
Toxic Hazards in Industry—part 5	95
Chemist's Bookshelf	97
Chemical Industry Outlines—The Sadler Group	98
Commercial Intelligence	100
Market Reports	100
Patents	102

BOUVERIE HOUSE · FLEET STREET · LONDON · EC4

Editor
GEOFFREY F. D. PRATT

Telephone : FLEet Street 3212 *(26 lines)*
Telegrams : Allangas · Fleet · London

Director
N. B. LIVINGSTONE WALLACE

Manager
H. A. WILLMOTT

Midlands Office,
Daimler House,
Paradise Street,
Birmingham
(*Midland* 0784/5)

Scottish Office,
116 Hope Street,
Glasgow C2
(*Central* 3954/5)

Leeds Office,
Martins Bank Chambers,
Park Row,
Leeds
(*Leeds* 22601)

The annual subscription is 52s 6d ($7.40), single copies 1s 3d (by post 1s 6d). Overseas subscribers may send their subscriptions direct to London, or remit through any of our agents.

AMBERLITE

ION EXCHANGE RESINS

Chemicals for Industry

Ion exchange technology has not only earned widespread recognition in water conditioning, where it had its beginnings, but has moved to other fields. Today, the AMBERLITE ion exchange resins serve in the production of pharmaceuticals; aid in the concentration and recovery of metals; deionize syrups; and make possible the analysis, isolation and separation of a host of compounds or elements heretofore considered too elusive for attack by conventional chemical techniques. In all of these applications the AMBERLITE ion exchange resins operate with dexterity and efficiency scarcely approached by older techniques.

Now available from British manufacture are AMBERLITE IR-120 high capacity cation exchanger and AMBERLITE IRA-400 strongly basic anion exchanger.

Detailed information will be sent on request.

CHARLES LENNIG & CO. (GREAT BRITAIN) LTD.

26-28 BEDFORD ROW
LONDON W.C.I.

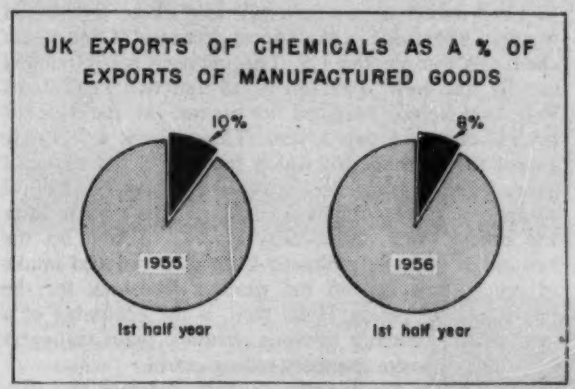
Amberlite is a registered trade mark of our parent company Rohm & Haas Co. Philadelphia

VIEWPOINT

Economic Summary 1956

AFTER a rather flambuoyant year in 1955, the economy was forced to sober down in 1956. The Government tightened the reins to control inflationary pressures, reduce imports, increase the level of exports and maintain confidence in sterling. These measures met with a certain amount of success. But inflationary pressure was not eliminated—for despite appeals for wage restraint by the Government, increased prices brought about an unprecedented spate of successful wage claims. By mid-year the trade gap had been substantially narrowed and a cheerful Chancellor was able to announce that in the first six months of 1956 a surplus of 'at least £100 million' on the balance of payments account had been achieved.

On the home front, prices did not fluctuate greatly; many firms announced their intention to 'freeze' their prices for periods up to a year. Industrial production remained fairly steady although the level reflected the long-awaited effects of the purchase tax and the credit squeeze.



Overseas the Government's measures met with greater success. The dampers on home trade had to a certain extent channelled production into the export market. Foreign confidence was boosted in sterling and altogether Britain was in a better position to face the seasonal strain of the summer months than in 1955.

Then—Suez. Already the rate of advance had been slowing down appreciably in the capital goods industries; consumer goods industries were feeling the chill winds of the credit squeeze. The Suez crisis led to speculation on the Continent against sterling, and the already strained dollar reserves looked like being strained even further. Altogether it was a damp and gloomy summer. By the time Britain reached the military stage in the Suez affair, it was obvious that the Chancellor's plans for economies in Government spending were disintegrating.

What is to be the outcome of the situation? Rising raw material prices, shortage of oil, petrol rationing, an alarming deficit in the dollar sector of foreign accounts, whispers about the strength of the pound—these are the factors that come to mind. Are the consequences of Suez going to thrust an additional burden on an already 'overburdened' economy? Will price increases all round follow from the rise in cost of oil and petrol and trigger off a new round of wage claims?

Now is not the best time to try and answer these questions. A great deal depends on whether the UN police force controls the situation or whether there is a fresh flare-up. Taking the optimistic view, the wider strains resulting from Suez will probably be short-lived. But whatever the burden, it will fall upon an economy that is by no means overburdened.

The gold and dollar reserves are depressingly unhealthy. Even allowing for the fact that the next six months are seasonally good ones for the sterling area's balance of payments, there now seems very little chance of a net accumulation of gold and dollars in that period.

Government spokesmen seem uncertain as to whether the consequences of the Middle East situation will prove inflationary or deflationary. For this reason it is difficult to see what policy the Chancellor will adopt for the 1957 Budget.

However, perhaps the most significant point is that the Government's policy so far has put the brakes on expansion in income—and output. The next few months are bound to see further cuts in production and some unemployment as well as growing under-employment. There will probably be pressure from the unions for higher wages—but their chances of success are slim. All in all, the immediate economic future looks unsettled.

How has the chemical industry come out of this? The credit squeeze has succeeded in slowing down the pulse rate of an industry which had an outstanding year in 1955. However, chemicals have still managed to keep ahead of the average for industrial production as a whole, as the following table shows:

Percentage Change in Production
1st half-year 1956 on 1st half-year 1955

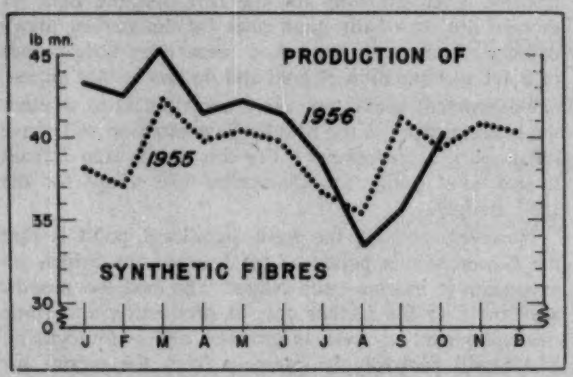
	1955	1956	*per cent change*
Phosphatic fertilisers (1,000 tons)	30.9	33.2	+ 7.4
Nitrogenous fertilisers (1,000 tons)	25.5	27.5	+ 7.8
Compound fertilisers (1,000 tons)	191.1	213.4	+11.2
Sulphuric acids (1,000 tons) ..	176.1	191.9	+ 9.0
Industrial ethyl alcohol (million gallons)	5.02	4.46	−11.2
Index of output 1948=100			
Chemical and allied industries ..	182.6	184.0	+ 0.8
Total industrial production ..	144.0	143.0	− 0.7

ECONOMIC SUMMARY 1956

The fall in production of ethyl alcohol during the first half of 1956 is of no particular significance—production normally fluctuates widely.

Chemicals are still doing well in the overseas markets and in the first ten months of 1956 exports passed the total during the same period in 1955. However, as the diagram on page 75 shows, there was an increase in the exports of manufactured goods, and as a percentage of the total exports chemicals were down 2 per cent in the first half of 1956.

The phenomenal rise in the output of plastics over the past two years has been firmly checked by the impact of the credit squeeze which dealt a knockout blow at the consumer goods industries. Sales of radios, television sets, refrigerators and washing machines nose-dived from their peak levels in 1955 and producers reduced orders for plastics drastically. Sales of motor cars hit rock bottom—and the manufacturers of thermosetting plastics materials suffered, as did the producers of synthetic fibres. The chart on this page shows the fluctuations in output for 1956 compared with the relatively steady flow in 1955. The plunge in August exactly corresponds to the all-time low in car production at that time. However, production has picked up since and specialised products, like tyre cord, have sold well abroad.



As a whole, exports of plastics have continued to rise—outpacing all other branches of the chemical industry with a 13 per cent increase—although producers have faced fierce price-cutting competition. But only a quarter or so of the output goes overseas so the 50 per cent advance in production that was recorded for the plastics industry in 1955 has become a 'no-change' position in 1956.

However, the long term outlook is by no means bleak for certain sections of the industry. Demand for polythene, for example, still runs high; the market for pre-packed foodstuffs is still in the early stages of development but already film-covered goods are selling at the rate of about 6 million packs a month, and polythene is one of the most used wrappings. Plastics piping has also been developed successfully—the peculiar properties of these pipes make them particularly suitable for piping chemicals and for use where there are wide variations of temperature. There is plenty of scope for business initiative in this field.

PLATINUM METALS REVIEW

Information for Chemists & Others

IN ORDER TO PROVIDE engineers, chemists, metallurgists and other users with current information on the properties and industrial applications of platinum and its associated metals (palladium, rhodium, iridium, osmium and ruthenium), Johnson, Matthey & Co. Ltd., Hatton Garden, London EC1, sole refiners and distributors of platinum from the Rustenburg Platinum Mines in South Africa, is publishing a new quarterly journal, *Platinum Metals Review*.

In the first number of this publication are included the following articles: The Protection of Chemical Process Equipment; Electrodeposited Rhodium in Co-axial Radio-Frequency Circuits; Electrodeposition of Ruthenium; A Thermocouple for High Temperatures; Creep Properties of Platinum Metals and Alloys; and The Platinum Metals in Catalysis. Comprehensive current literature abstracts on the platinum metals and their alloys are also provided.

The immediate future is overshadowed by the oil shortage. During the past few years oil has become an important source of production of many plastics—including polythene from ethylene—and petrochemicals are now the source of about one-third of all the organic chemicals produced in this country. Output is estimated at 400,000 tons a year. Supply prospects for the petrochemical industry seemed assured by the fact that petroleum was readily available and had the advantage of comparative price stability compared with coal and industrial raw materials as a whole. Britain led the field in Europe as the largest producer of petroleum chemicals outside the US. The industry has expanded rapidly and only a month or so ago two new plants were completed, designed to operate at the rate of several thousand tons a year. These plants are closely geared to the refineries which supply the raw material gases directly from the catalytic crackers. If the oil companies shut down their catalytic crackers one after the other—some are already closed—to step up the volume of fuel oils produced from their reduced intake of crude, they cut off the gaseous feedstock for the petrochemical plants. Here, then, is the beginning of a struggle for existence between chemical plant managers and their opposite numbers selling petrol.

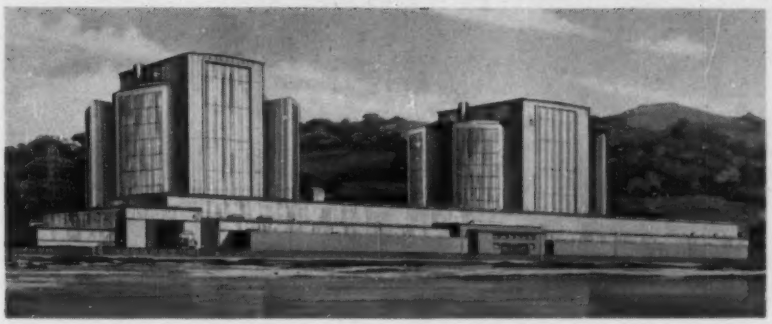
Some plants use naphtha as their feedstock and they can expect to get supplies from the straight-run distillation that precedes cracking operations. Some alternative sources of propylene gas are also available—but not enough to keep output up to normal levels if the catalytic crackers shut down.

The effects of the shortage of petrochemicals will hit the paint and plastics industries hardest.

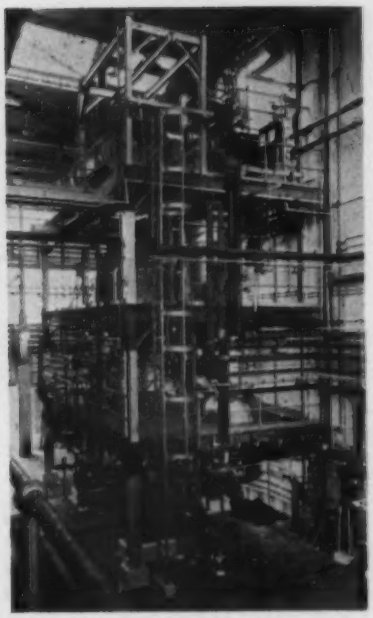
However, it is generally considered that the oil shortage is but a temporary situation: it is unlikely that serious disorganisation of supplies will continue after July, and the interregnum may in fact prove shorter. So essentially optimistic chemical industrialists are going ahead with ambitious plans for expansion in 1957.

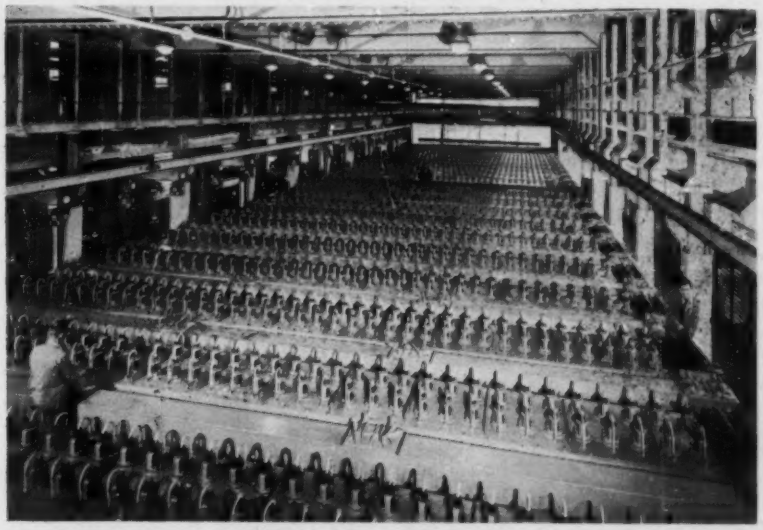
A large question mark hangs over 1957: will the Middle East embroglio flare up again? What will be the outcome of the situation at home—inflation or deflation? The outlook is unhappily obscure.

PICTURES OF THE YEAR



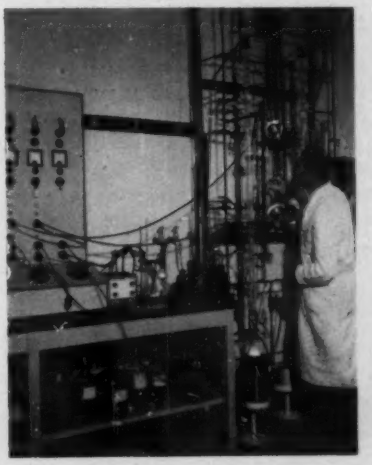
An impression of the complete nuclear power station to be built by the GEC-Simon-Carves Atomic Energy Group for the South of Scotland Electricity Board. It was announced in December that negotiations for a site at Hunterston, about 30 miles from Glasgow, are taking place and a public inquiry is to be held. As a result of the Suez crisis, Britain's nuclear programme has been stepped up. An official statement is expected to be made shortly

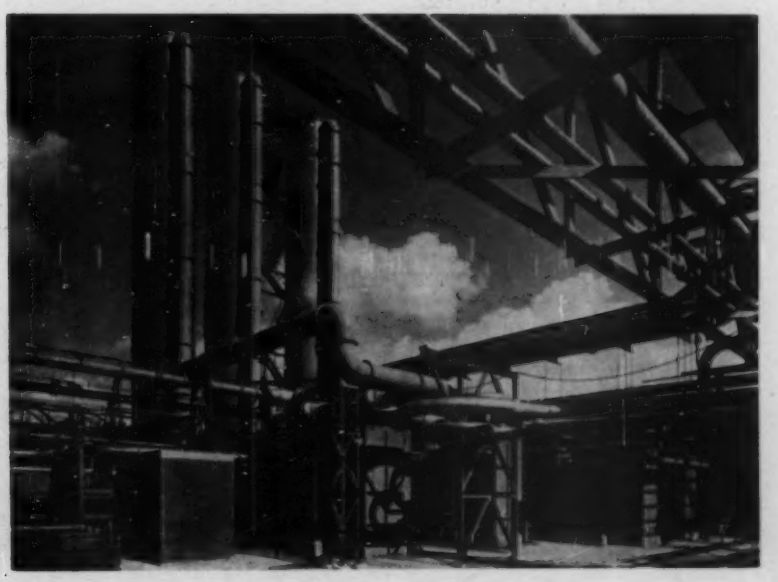




The illustration above shows the styrene recovery unit of the synthetic rubber plant at Fort Dunlop, Birmingham, development of which was announced in December. Left: Mercury cell room at Murgatroyd's Salt and Chemical Co.'s Elworth plant, which came into operation in March 1956. Below: The benzole scrubbers, secondary naphthalene washers and ammonia washers at the NCB's Avenue Carbonisation and Chemical plant at Wingerworth, opened on 30 October. The unit is said to be the most modern and completely integrated of its kind in Europe. It is on a site of 188 acres. Photograph by courtesy of Woodall-Duckham Construction Co. Ltd., London SW3

Below: Apparatus for fractionating volatile compounds at the Unilever laboratory opened in Holland on 16 November by Premier W. Drees





Greetings from the Chemical Trade Leaders

IT IS with great pleasure that we include in this issue seasonal messages from a large number of chemical trade leaders. To the gentlemen concerned and to their associations we express our thanks for the interest which they have shown in this feature and for their co-operation in making possible its presentation

C. F. V. BLAGDEN, chairman, The British Chemical & Dyestuffs Traders Association. I am delighted to take this opportunity of sending New Year greetings to all friends in the chemical and allied industries. And to THE CHEMICAL AGE I send best wishes for continued success.

The contribution which the chemical industry has made to British export trade during the past year gives solid grounds for confidence in the future. The prosperity of our country is linked with a thriving trading community, and no other field offers greater scope than the expanding knowledge and use of chemical products.

By keeping abreast of technical advancement and providing efficient service, the merchant brings to the consumer industries, at home and overseas, the benefits of modern materials and processes.

We all desire an enduring and honourable peace and I believe this could emerge from a greater flow of goods and services between nations. Present trends are towards a closer association with neighbouring countries, and there is a growing awareness of the possibilities for good in the proposal to create a partial free trade area which the Government, after consulting industry, has under consideration.

As merchants we welcome encouragement to enterprise and I am confident that, with restraint and goodwill on all sides, British products would more than hold their own in the open market which is envisaged.

The future will not be without its difficulties but, as in the past, British chemical merchants will approach their problems collectively through their Association. It is the spirit of co-operation for the common end, which finds expression in the support given to the Association, that will minimise the frictions of change and surmount future problems.

Without being complacent we can begin the New Year with hopeful expectation of further progress for the merchar

My best wishes for the prosperity of all.

L. W. BLUNDELL, M.Sc., A.R.C.S., F.R.I.C., president, The National Benzole & Allied Products Association. I count it a privilege to send New Year greetings through the pages of THE CHEMICAL AGE from the members of this Association to all friends in the chemical and allied industries.

There is a very happy and close relationship between us, and we are proud to be the suppliers of some of the most important raw materials required for the production of a wide range of products. During 1956 demands for the products of the benzole industry again increased and further expansion seems certain. Members of this Association are ready to equip themselves with adequate plant to ensure that all calls made upon them will be met. Close co-operation has been maintained with Government departments in order to demonstrate the Association's competence to handle matters of common interest and to ensure essential supplies of home-produced spirits.

The Association is also concerned with the publication of specifications for the products of the benzole industry. During the past year a committee of experts was engaged in the work of bringing up to date the handbook *Standard Specifications for Benzole and Allied Products.*

In the sphere of standardisation the Association is also active. It is co-operating with the continental producers through membership of the International Conference of Benzole Producers, and its delegates have also participated in the meetings of the International Standards Organisation Technical Committee 78 on Aromatic Hydrocarbons. It is believed that all such contacts are of benefit to our own industry and to the many essential trades we serve.

Great Britain has been honoured with the presidency of the International Conference of Benzole Producers for 1957, and the Association will act as hosts for the annual conference which is to be held in London during May.

I wish THE CHEMICAL AGE and all its readers a successful and prosperous 1957.

E. P. BUTLER, president, The Association of Tar Distillers. The friendly and valuable association between the chemical industry and the tar industry has continued throughout the year. It has expressed itself through individual arrangements; in collective agreements made between

L. W. Blundell

W. G. Hiscock

N. L. G. Lingwood

A. J. Kent

G. N. Hodson

C. D. O'Sullivan

G. V. Sims

C. C. Last

G. T. Gurr

T. G. Robinson

tar distillers and users of tar products in the chemical industry; and in continued close contact between the trade associations of the two industries.

It is always necessary, but particularly now in view of the uncertain position of overseas supplies, that the maximum use should be made of our indigenous raw materials. In the effort to achieve this the links between the chemical industry and the tar industry are automatic and imperative. It is, therefore, pleasing to record a co-operation which, starting with research, continues through to delivery.

Through the Association of Tar Distillers the tar industry is able to focus discussion and express policy. In deciding this policy the essential nature of tar products is kept fully in mind.

As president of the Association of Tar Distillers I welcome this opportunity of sending the best wishes of the members to THE CHEMICAL AGE and the industry which it serves. May 1957 be happy and prosperous.

LORD GEDDES, president, The Institute of Petroleum. The Institute of Petroleum has continued its work in the technological field, and one of the most important functions during last year was undoubtedly the summer meeting at Torquay. Here a number of outstanding papers were delivered and discussed on the subject of 'Essential Factors of the Future Development of the Oil Industry.' The resulting book, which has recently been published, is of particular interest to those engaged in the steel and shipbuilding industries.

Further editions of the Institute's model code of safety practice in the petroleum industry have been published, and the series now covers the electrical field as well as marketing, refining and production. Work is commencing on a further code to cover tanker operations.

The hydrocarbon research group held a very successful conference on chromatography in the early summer, with a record number attending.

It is expected that the new home of the Institute in London will be ready for occupation by the autumn.

M. N. GLADSTONE, chairman, The Association of British Insecticide Manufacturers. Development in the crop protection field has been spectacular and rapid during the last 10 years, so rapid in many instances that it has not been possible to publish as much of the information amassed by the research and technical departments of commercial firms as might be desirable. Lack of background knowledge has sometimes led to ill-informed statements which have caused misunderstanding and alarm among the general public.

The Association of British Insecticide Manufacturers has been conscious of the lack of co-ordination of information available within the industry, and it has now established a public relations committee under the chairmanship of the vice-chairman of the Association, Mr. H. G. Huckle. The members are Mr. S. K. Garratt, Dr. G. L. Hogben and Mr. F. W. Morris.

A principal function of the committee is to supply the press with background information on crop protection matters; it exists to help the press as a whole and all inquiries will be dealt with promptly.

W. G. HISCOCK, Ph.D., chairman, Association of Chemical & Allied Employers. Last year was rather difficult in the field of industrial relations. The wage cycle which started in the autumn of 1955 and continued in the early months of 1956 resulted in exceptionally large increases in the basic rates operating throughout industry. In the chemical industry an increase of 2½d p.h. was negotiated by the Chemical and Allied Industries JIC in January. It was followed by stiff bargaining and resort to arbitration by the trade unions representing engineering maintenance workers and the basic rate for skilled craftsmen was increased by 3½d p.h.

Later applications for fringe benefits of various kinds were received so that negotiations with the unions were virtually continuous throughout the year. They were conducted, however, in the amicable way which has become the established practice in our industry, and at no time was there anything in the nature of a threat to production.

Safety and health of the workers has always been a matter of the greatest concern to the employers, and a new safety council established jointly by ABCM and AC & AE is attempting to pool and make known the experience of the firms whose work in this field has been outstanding. The scheme for training qualified chemical operators, now in its fourth year, is continuing to attract recruits.

The broad picture of the industry is, therefore, one which continues to show improved conditions of work and to attract and train a good class of personnel. The present difficult position of the country will have repercussions upon industrial relations in 1957, but we naturally hope that the good relations which have been built up throughout the years will stand us in good stead.

G. N. HODSON, M.B.E., J.P., chairman, British Chemical Plant Manufacturers Association. I am very glad to have this opportunity of sending New Year greetings on behalf of our members to their many friends in the chemical and related industries.

In these columns last year my predecessor said he looked forward with every confidence to 1956. Though, in common with other sections of the engineering industry, we have not been without our difficulties, I do feel that events have shown his optimism was justified. During the past year the British chemical plant industry gained many large contracts at home and abroad, and continued to play its part in helping the home chemical industry to carry out an impressive expansion programme.

For us, however, 1956 will be remembered as 'Calder Hall Year.' With the opening of the nuclear power station at Calder Hall in October, the culminating point was reached in a period of some 11 years during which atomic energy projects have made large, exacting and, in many ways, unusual demands upon our industry. It is a source of pride that we have proved equal to those demands. In the process we have added greatly to

our skill and experience in manufacturing large-scale chemical plant for operation under conditions of the utmost severity.

Nevertheless, Calder Hall is only a milestone and not the end of the road. Already pressure vessels larger and thicker than those surrounding the reactors at Calder Hall—thought to be the largest which could in all circumstances be built—are envisaged. And in other sections of chemical industry development continues apace.

We look forward with enthusiasm to the big tasks ahead.

A. J. KENT, president, The Association of British Organic Fertilisers. Demand for organics has been maintained during the past year despite increased labour costs and further increases in freight charges. It says much for the importers and distributing merchants that prices have been kept at an economical level. In several instances prices are actually lower than a year ago, and this has undoubtedly acted as a stimulant to the continuity of trade.

The industry's main users are horticulturists and market gardeners. In the past year there has been a sharp increase in demand for organics in compounds with inorganics; this provides farmers with an all-Europe fertiliser at reasonable price. It also insures good and lasting results.

Although the Association (founded in 1939) is the youngest of the bodies associated with agricultural trade, the Council is mindful of the necessity of keeping the trade informed of its purpose. A handbook *Organic Fertilisers—Their Properties and Uses* has met with world-wide demand.

For the first time the Association staged an overseas convention with success, and now, after much thought and discussion, forms of contract are available to all who deal in organics, whether or not they are members of the Association.

Increased cattle production in Great Britain over the past two or three years has automatically shown an increase of byproducts and therefore of home-produced organics. In this way the Exchequer has been saved expenditure in foreign currency. The increase of home-produced organics should prove a useful source of supply, if the difficulties of obtaining imported raw materials are made greater by the Middle East crisis.

It is hoped that all members will continue to support the Association in the future, as in the past, and thus promote the uses and benefits of organic fertilisers.

J. S. Woollam *T. Williams*

C. C. LAST, chairman, The British Plastics Federation. I take great pleasure in sending greetings from the members of the British Plastics Federation to THE CHEMICAL AGE and its readers.

It is impossible to write about 1956 without mentioning the credit restrictions which the Government has found necessary to impose, and the consequent reduction in sales by important plastics consuming industries, notably those producing radio and television sets, domestic capital goods, motor cars and furniture. It was not to be expected, therefore, that the plastics industry could repeat in 1956 the 16 per cent increase over the previous year which it achieved in 1955.

Nevertheless, in the first half of 1956, 168,000 tons of plastics materials were produced, or 4 per cent more than either the first or second halves of 1955. It is expected that the second half of the year will show a similar increase. Exports have made a large contribution to this increased output, and for the first nine months show an increase of nearly £2 million on the same period of 1955.

In September, at Torquay, the Federation held its first convention. This was well attended and is considered to have been a very successful venture. Apart from the customary social events and outings for the ladies, papers were read and discussed on 'Plastics in Proportion,' 'Spotlight on Export Practice,' 'Polythene in the Home,' and 'The History of Combs.'

During the year the Federation has continued its normal activities; in particular the technical committees have done very useful work, much of it in conjunction with the British Standards Institution.

I send good wishes from the plastics industry for a very prosperous year with confidence that the chemical industry is ready to meet the demands of the future whatever they may be.

N. L. G. LINGWOOD, president, The British Acetylene Association. Industry throughout the country and Commonwealth owes much to the foresightedness of the pioneers of the acetylene trade who, 56 years ago, founded the British Acetylene Association. The recommendations promulgated at that time and later have very largely formed the basis on which all subsequent legislation and bylaws in connection with the industy have been built.

Though the pioneers of the industry undoubtedly had visions of the expanding use and application of acetylene, it is fairly safe to assume that none could have imagined the extent to which the gas is now used and the very varied applications to which it is put. Nevertheless the pioneers built well and we who follow should pay tribute to their efforts.

The British Acetylene Association keeps watch on developments in the industry in this country and overseas. Through the various international organisations on which it is represented, the Association endeavours to keep legislation concerning the industry in as simple a form as possible, commensurate with the high standards laid down by the pioneers.

I have much pleasure in sending seasonal greetings to the many users of acetylene throughout the world and best wishes for peace and prosperity throughout 1957.

More Greetings from the

C. D. O'SULLIVAN, president, The Society of British Paint Manufacturers. I have no hesitation in sending THE CHEMICAL AGE my greetings and best wishes for 1957, for I think that in common with all citizens of this country, it will desire to be fortified with good wishes for the year that lies ahead.

At this time last year, it gave me equal pleasure to send my greetings for 1956, and I then went so far as to say that although I was not unduly optimistic, I felt that reasonable prosperity could be attained, subject to national and international finances being placed on a firmer footing. I hold precisely the same view today, but there is an international background which I cannot disregard, for with the Suez Canal still blocked and merciless repression in Hungary, I cannot feel a wave of even qualified optimism.

It seems to me that we are likely to pass through another time of severe testing, but I am confident that the industry is sufficiently tough and virile to deal with any emergency, and with

Chemical Trade Leaders

this as a foundation thought I wish your readers the best of fortune in 1957.

T. G. ROBINSON, president, The British Wood Preserving Association. The annual convention was held at Cambridge University last July and over 200 delegates were present. Seven papers were presented, many illustrated with lantern slides. These papers dealt with 'Use of Timber in the construction of Sea Defence and River Works,' 'Ambrosia Beetle Problem and Log Protection in West Africa,' 'Termites Destructive to Timber,' 'Contribution of Wall Linings to the Growth of Fire,' 'Preservation, Inspection and Maintenance of Transmission Poles,' 'Investigations on the Oak Pinhole Borer—*Platypus Cylindrus Fab.*', and 'Timber Preservation and the Architect.' The 1957 convention will also be held at Cambridge University from 3 to 6 July, when it is anticipated that a paper will be presented by a representative of the Central Electricity Authority, dealing with recent research work on the problem of soft rot.

During last year the booklet on timber preservation (prepared in collaboration with the Timber Development Association) has been completed, and specifications for the two waterborne preservatives, Celcure and Tanalith U have been prepared and printed. The leaflet dealing with the use of organic solvent type preservatives has also been printed and it is hoped that leaflet No. 10, dealing with water-borne preservatives, will be available shortly.

Over 2,500 enquiries relating to timber preservation have been handled during 1956. As in the past years over 60 lectures on timber preservation have been arranged for professional associations and institutions throughout the country.

The Service Records and Service Tests Committee inaugurated certain important test work at Poole harbour, where the hazard is *limnoria*. Fifty-four pieces of fendering, each 10 ft. by 10 in. by 5 in., have been installed. Of these there are 22 pieces of untreated timber, a number of species being used. The rest are pieces of elm fendering treated with a number of preservatives in a variety of ways.

This work is being undertaken in collaboration with the TDA as is other test work at Shoreham harbour. At Shoreham 17 sets of beech treated with a number of preservatives have been sunk at varying depths. Each set consists of six treated pieces and one untreated control, each piece being 6 in. by 6 in. by 3 in. The hazards at Shoreham are *limnoria* and *toredo*.

At the Tynwarnhale mines in Cornwall, tests are being carried out in collaboration with the Imperial College of Science & Technology and the Royal School of Mines, with treated ladder sides. Altogether some 23 pairs of ladder sides have been treated with a number of preservatives. Conditions in this mine are exceptionally damp. Arrangements for this year include fencing tests to be carried out at Sunninghill field station, and further tests at Shoreham.

L. T. SAWNEY, M.C., president, The Glass Manufacturers Federation. We live in stirring times. From slow beginnings the tempo of scientific investigation has quickened to an unforeseen extent. The scientist, hitherto regarded as a recluse, has thrown open his laboratory doors and offered opportunities that startle and excite the imagination. This, coupled with man's inventiveness, offers a standard of living far beyond the Utopian dreams of our ancestors.

With all this activity the British glass industry is intimately and actively associated. Glass technology contributes to the knowledge of the scientist and, at the same time, benefits from scientific research. Laboratory experiment is inconceivable without scientific glassware ranging from simple products to apparatus of great complexity.

Practical application of scientific research has led to the development of glass equipment and apparatus on a scale suitable for the plant. On the other hand, scientific research has helped the glass industry to solve many problems in melting and processing its materials. This, in turn, has led to a far greater control over the quality of the product and the development of glasses for general and specific purposes. The development of atomic energy has posed special problems, the solution of which has produced radiation-resistant and radiation-sensitive glasses.

At the beginning of a year it is customary to review the past and anticipate the future. Looking at the past we see that for centuries the British glass industry has not only served but collaborated with the scientist. Anticipating the future is no easy task. Of one thing we are certain; the tempo of scientific investigation will not lessen.

My message, then, is that in whatever paths scientific investigation may lead, readers of THE CHEMICAL AGE may count upon the active and full co-operation of the British glass industry.

A. H. Whitaker

L. T. Sawney

G. V. SIMS, chairman, Council of British Manufacturers of Petroleum Equipment. While June 1958 may appear to be rather a long way off, nevertheless in that month and year, the first joint exhibition of plant and equipment used by the petroleum industry and the chemical industry will be held at Olympia, London.

Considerable efforts are being made to have this exhibition publicised throughout the world. Here, therefore, will be opportunity to show in 'a big way' products for the petroleum and chemical industries to buyers and users from most countries overseas. There will be the further opportunity to display our products and technical know how with the object of promoting export sales.

Therefore, 1957 is a year in which preparations are being made for a successful exhibition in 1958.

A. H. WHITAKER, chairman, The British Colour Makers Association. There has been a steadily increasing demand for pigment colours during 1956, not only from paint and printing ink manufacturers, but from many of the newer pigment using industries. Members of the British Colour Makers Association have participated in this greater demand for their products, but increasing costs have made it extremely difficult to expand business in export markets.

If the oil shortage arising out of the present international situation continues it may have some effect on pigment colour production and on the supply of raw materials used in their manufacture, but I feel confident our members will surmount these difficulties as they have done many others in the past.

Research continues to evolve new pigments, improve quality of existing standards and to find new uses. Efforts

Leaders' Greetings

are being devoted to the evolution of 'tailor made' pigments for specific industries and for increased productivity. Shortage of trained technical staff is still acute. This is likely to remain a problem, so far as can be seen, for some years.

A number of our members have been actively engaged on work pertaining to certain BSI committees and the Association is indebted to them for their efforts and for the time they have devoted to these matters.

I send my best wishes to all members of the BCMA and also to the pigment-using industries for a successful 1957, even though there may be some difficult months ahead for all.

T. WILLIAMS, chairman, The Superphosphate Manufacturers Association. It is with much pleasure that I send greetings on behalf of the members of the Superphosphate Manufactuers Association to all friends in agriculture and in the chemical and allied industries.

With pleasure I recall the interest which the Government continues to take in matters agricultural, and that on this issue, if no other, it has the full support of the opposition party.

Industrialists have certainly not found 1956 a dull year; rather the reverse. Anti-inflationary measures created a great deal of activity if not alarm. These included raising of the bank rate to 5½ per cent, hire purchase restrictions and general tightening of credit facilities with a continuation of the restriction on capital issues.

The Government appealed for a 'price freeze' which was followed by many industries who pegged prices for a limited period. Then came the amended Monopolies Act and the Restrictive Trade Practices Act and, more recently and with what many regarded as undue haste, the Government called on industry for its views on the advisability of entering a limited form of a European free trade area. The industry has decided to support the Government's suggestion of investigating the possibility of entering a limited European free trade area. It has pointed out the dangers which could arise, in the absence of suitable safeguards, as a result of dumping and unfair trading practices.

In the 1956 New Year Honours the Association's general manager, Dr. G. F. New, was appointed OBE.

During the year the United Kingdom was host to the international convention of superphosphate manufacturers; representatives of more than 20 nations attended. This event marked the close of the successful presidential term of office of Mr. D. J. Bird, one of the UK representatives.

The superphosphate industry in 1956 coped with all demands placed upon it and tonnages produced and delivered were the highest for many years. The industry has made substantial investments to enable it to deal with further increased demands in the future.

Port facilities for the industry's raw materials are not yet comparable with those of the continent, and improvements here, both human and mechanical, could and should be made. Freights continue on a high level and show little signs of diminishing. Political troubles continue to cloud the horizon in regard to one of the major raw materials—rock phosphate—the bulk of which comes from North Africa. Despite the troubles, however, the French authorities have during 1956 achieved a record output.

Though the early part of 1956 was marked by an improvement in international relationships, there has since been an increase of tension. It is hoped that a reinvigorated and more active United Nations organisation will emerge with a sharpened realisation of its duties and obligations so that 1957 may see peace fully restored throughout the world.

G. F. WILLIAMS, chairman, Association of British Chemical Manufacturers. It is again my pleasure and privilege to wish all readers a prosperous and peaceful 1957.

During the past year we have seen the continuous growth of the chemical industry and the announcement of future plans for large expansion, particularly in the field of chemicals from petroleum, synthetic rubber and plastics. Our exports were 7 per cent greater in value last year than in 1955 and ranked third highest among British manufacturing industries.

That this performance was achieved in the face of growing competition and a fall in the country's overall share of world business is, however, no justification for us in the chemical industry to rest on our laurels; pride in achievement must be matched with determination to meet future competition wherever it may arise. Indeed, we now face a challenge in the form of the proposal to establish a free trade area with the European common market, but such an association could open up for our industry the rapidly growing market of Western Europe.

To make the fullest use of the heavy capital expenditure undertaken by our industry, continuous and careful study of the problem of productivity is essential. It is only thus that we shall keep in the forefront of progress and improve our competitive position.

Forecasting can be dangerous, particularly in the present situation but if no unforeseen obstacles are put in our way, the industry, I think, can look forward with confidence to 1957.

J. S. WOOLLAM, chairman, The Association of British Sheep & Cattle Dip Manufacturers. It is the sincere desire of all the members of our Association to convey through me to your readers our best wishes for the year 1957.

The 12 months' period just passed has not been without its difficulties. Conditions of trade are becoming increasingly exacting, to say nothing of the Near East crisis.

Under these conditions, therefore, the manufacturers of finished products look for, and indeed appreciate more than ever before, help from that section of industry engaged in providing them with industrial chemicals. We feel sure that your readers in turn, constantly look to the chemical engineering section of the industry to provide them with improvements in plant and general production rhythm.

It is indeed largely through the medium of such a paper as THE CHEMICAL AGE that this process is stimulated and knowledge disseminated throughout the vast chemical industry. It is right to say that we live in a 'Chemical Age,' and the manufacturers of the finished products of this age are largely dependent on a live and virile chemical industry furnishing them with basic raw materials at the keenest possible prices.

Difficult as this year of 1957 may prove to be, we feel there will be no adversities that cannot be overcome if those who work in this vast industry appreciate each other's problems and labour with a common will to achieve that desirable object—an increase in the export of British-made products.

G. F. Williams

WEST GERMAN CHEMICAL REVIEW

Confidence in Ability to Maintain Progress

ALTHOUGH the rate of expansion has slowed down, the West German chemical industry entered the new year full of confidence in its ability to maintain the progress of recent years. Production costs have risen as a result of higher wages and shorter working hours as well as increased prices for coal, steel and imported raw materials carrying higher freight charges. In foreign markets German suppliers note a narrowing-down of their cost advantage over competitors from other countries and a further contraction of the overseas demand for the more easily produced chemical manufactures for direct consumption such as cosmetics, pharmaceuticals, dyes and paints. But even in some of these groups expanding sales of new products have more than made up for market losses due to establishment of local industries.

In January-September, West German chemicals exports were 12.5 per cent higher than in the corresponding period of 1955, and this rate of increase seems to have been maintained until Christmas. Industrial chemicals and synthetic materials fared best, while exports of dyestuffs and nitrogen fertilisers show a decline compared with the preceding year. The pharmaceutical industry has made up for previous export losses, but part of the improvement may be due to replenishment of stocks held by overseas distributors. Imports of chemical products, as distinct from chemical raw materials which were imported in slightly larger amounts only, rose as much as exports, largely because of the improved demand for plastics and fibres not yet made in adequate quantities by German producers.

Typical of the experience of large chemical producers with a wide spread of manufacturing interests may be the figures released by Farbenfabriken Bayer AG, Germany's largest chemical group. Total sales rose by 10 per cent in 1956, compared with 18 per cent of the two preceding years. If allowance is made for the fact that prices improved in 1954 and 1955 and showed a decline last year, the volume increase in sales was probably not much smaller than in preceding years. In specialised fields Bayer did well with agricultural plant protection chemicals and photographic film; over 60 per cent of the agricultural chemicals went abroad, while home and export sales of this group showed a three-fifths rise over 1955. In older manufacturing fields Bayer had to devote considerable attention to new products in order to achieve even a modest increase in sales.

Investment by Bayer

Once again Bayer invested large sums in new production and research facilities. Over DM200 million was spent on new plant in 1956, and it is interesting to note that a substantial proportion of this was expended on new power and water supply plant, ancillary services and plant designed to improve the quality and reduce the cost of products in current supply rather than on the expansion of output capacity. A new isotopes laboratory has been built at Elberfeld, and the central scientific laboratory at Leverkusen has been rehoused. Labour questions caused some concern and led by the middle of 1956 to a temporary ban on engagement of new staff. Nevertheless, the total labour force rose from 44,800 at the beginning of 1956 to 46,500 at the end of October. Salaries and wages cost DM320 million in 1956, against DM278.5 million in 1955.

Phosphorus Output

Germany's large phosphorus producer, Knapsack-Griesheim AG, has an annual output capacity of 35,000 metric tons of yellow phosphorus, said to be equal to the British capacity, at its disposal since the second phosphorus furnace, the largest of its kind in the world, was put into commission early in October. Pending completion of this furnace, elementary phosphorus had to be imported into West Germany from the US, Canada, Britain and France to meet the growing demand due to increased production of detergents. The company is now in a position to use any kind of crude phosphate and has also erected new plant for the production of phosphoric acid and salts.

The works at Knapsack near Cologne are also the largest producer of calcium carbide and cyanamide in West Germany. The carbide plant was enlarged by erection of what is believed to be the biggest carbide furnace in the world. Despite full-scale production, however, substantial tonnages had to be imported from Belgium, Holland, Switzerland and Czechoslovakia from April onwards. The new carbide furnace uses 35-36 and the phosphorus furnace 46 megawatts.

US Financial Interests

One of the big US chemical groups, the Olin Mathieson Chemical Corporation, has taken a financial interest in Chemische Fabrik von Heyden AG which has also entered into arrangements with Ruetgerswerke AG, the German coal-tar group. The German firm has started the production of uranium salts, but it is understood that the new funds obtained are to be used for expansion in other directions.

Substantial sums for the advancement of nuclear research have been set aside in the supplementary budget for the Ministry of Atomic Matters passed in December. These include DM2.2 million for scientific research, DM1.5 million for training facilities, DM3.4 million for nuclear technology, DM2.5 million for exploitation of uranium deposits, and DM17 million for nuclear research through grants for modernising and extending scientific institution and installations

Leaders' Greetings

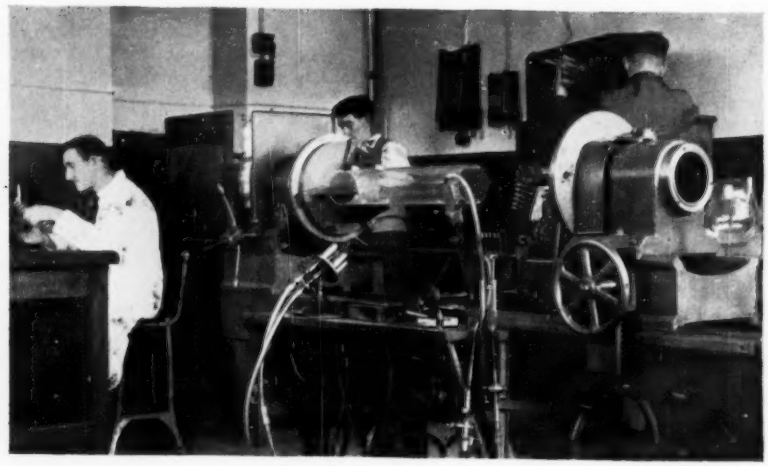
G. T. GURR, F.R.I.C., president, British Association of Chemists. It is an agreeable practice at the opening of each new year to send greetings to our friends, and on behalf of each member of the British Association of Chemists I extend to readers of THE CHEMICAL AGE and all our colleagues best wishes for health, happiness and prosperity in 1957. Let us in the chemical industry continue to face and overcome our difficulties—as we have never failed to do, and make the year another record of progress.

The BAC has now entered upon its 40th year with an enviable record of 39 crowded years of experience and service in protecting the economic interests of chemists. Its unemployment benefit fund now has reserves of over £60,000 and has distributed over £25,000 in benefits to its members. This is now supplemented by a substantial benevolent fund which provides for special cases of hardship among unemployed members.

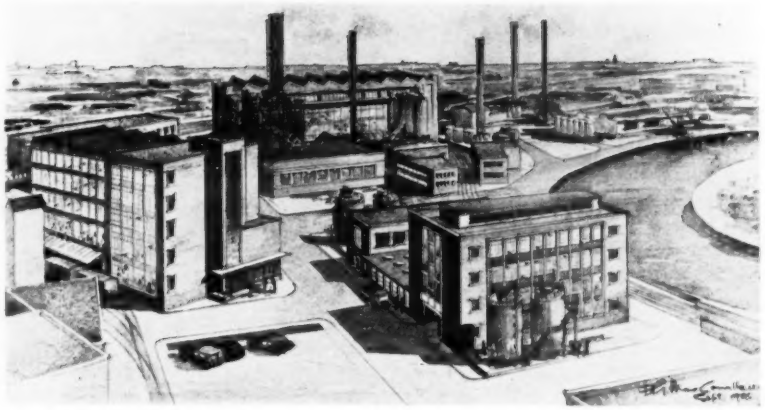
During the past year the BAC has accepted an invitation to become one of the founder members of the Federation Internationale des Cadres de la Chimie et Industries Annexées (FICCIA), a non-political professional body, so that we are now linked with our fellow chemists in the principal Western European countries—and find we have many problems in common.

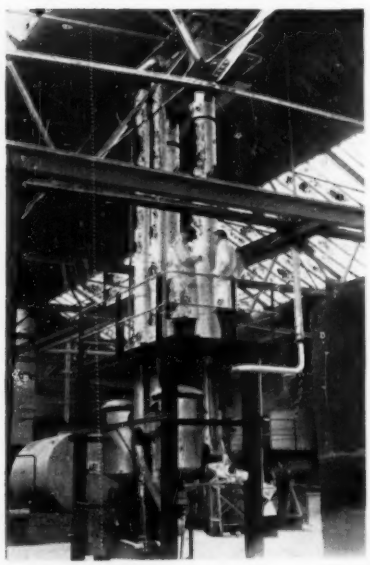
We enter the new year encouraged by many letters of goodwill and appreciation, and confident in our ability to serve the interests of our members and the chemical industry. Service to chemists is our business.

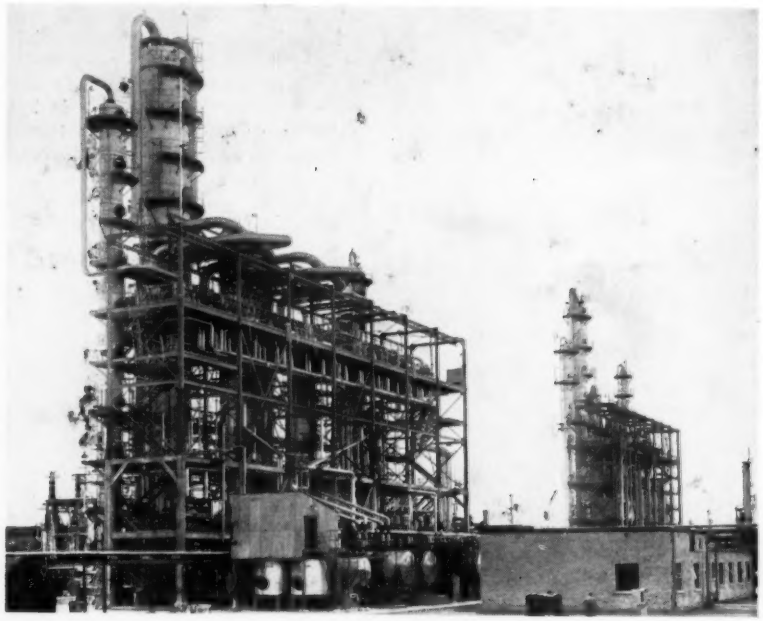
MORE PICTURES OF THE YEAR



Above: Glass-blowing shop for making experimental equipment at BORAD, which was formed on 1 October. Above, right: Alkathene being extruded at ICI Plastics Division's £500,000 technical service and development laboratories, opened in September. Right: architect's impression of the £5 million factory to be built by Joseph Crosfield & Sons Ltd. The company stated in November that it would take about eight years to complete. Below, left: concentration section of Associated Lead's Liverpool plant which started up in June. Below, right: new distillation area inaugurated at Grangemouth on 7 November by Forth Chemicals Ltd.







NOTE & COMMENT

CATALYSED NUCLEAR REACTION

A NEW KIND of nuclear reaction that yields energy and is akin to thermonuclear reactions is claimed by physicists working at the University of California. The work, which is described as catalysed nuclear reaction, has been reported by Dr. Luis W. Alvarez to the American Physical Society. The US Atomic Energy Commission states that the discovery 'adds to those reactions already known to science a new and third way of making a nuclear reaction take place.' The other two methods are to induce thermonuclear reactions in which two light nuclei fuse into a heavier one when the temperature is raised to about 1 m. degrees; and secondly, to bombard nuclei with other nuclear particles from accelerators such as cyclotrons or nuclear reactors.

The new method is described as 'a way of pulling two nuclei together so that a proton and a nucleus of heavy hydrogen (a deuteron) can combine to form helium-3 with the release of 5,400,000 volts energy.' This new discovery is at present only a laboratory phenomenon. It is stated by the Atomic Energy Commission that the chain of catalysed reactions cannot continue long enough to generate commercially useful amounts of power as mu mesons decay into other particles after two millionths of a second. The mu mesons can be made only in high-energy nuclear collisions of particles accelerated by cyclotrons and other expensive machines.

If, however, a much longer-lived particle is found with properties similar to that of the mu meson, there would be interesting possibilities. Evidence for such a particle has been reported by the Russian physicist Alikhanian.

An opinion given to THE CHEMICAL AGE following last week's brief reference (p. 10) suggests that the stage of usefulness of the new atomic reaction can be compared with the work of Sir John Cockcroft 30 years ago. It is also considered that it may well be up to 20 years before the reaction can serve a useful purpose.

GIBBERELLIC ACID AND GROWTH

RESULTS of larger-scale experiments with gibberellic acid on field crops of grass, wheat, roots etc., begun in July 1953 and continued for three years are reported by D. G. Morgan and G. C. Mees of Imperial Chemical Industries Ltd. (*Nature*, 1956, **178**, 1356).

Optimum rate of application of gibberellic acid was found to be 2 oz/acre of the acid in 100 gallons of water. Four to 10 weeks after treatment each plot was cut, the grass weighed, sampled for dry weight and crude protein (total nitrogen) determinations. Gibberellic acid was found to increase the growth rate of all components of the swards. The growth effects were observed even when there was little or no response to fertiliser alone. Nitrogen content was lowered by about 2 per cent after treatment so that yields per acre of crude protein were not increased to the same degree as the dry-weight yields.

Compared with nitrogenous fertilisers, initial growth response was more rapid. The difference persisted longer in spring and autumn when natural growth is slower. However, it is reported that eventually yields obtained with fertilisers were greater than those obtained with gibberellic acid. A temporary chlorosis accompanying increase of growth of the grass was observed. Normal green colour returned within six to eight weeks, or, if a nitrogenous fertiliser was applied together with the gibberellic acid, within a much shorter period.

It is of interest to note that yield increases given by gibberellic acid and fertiliser applied together, were additive. However, if after cutting the acid was not applied, the dry matter and crude protein yields at the second cut were depressed by approximately the amount of the increase at cut 1. Therefore, the total yield over the two cuts was not significantly increased.

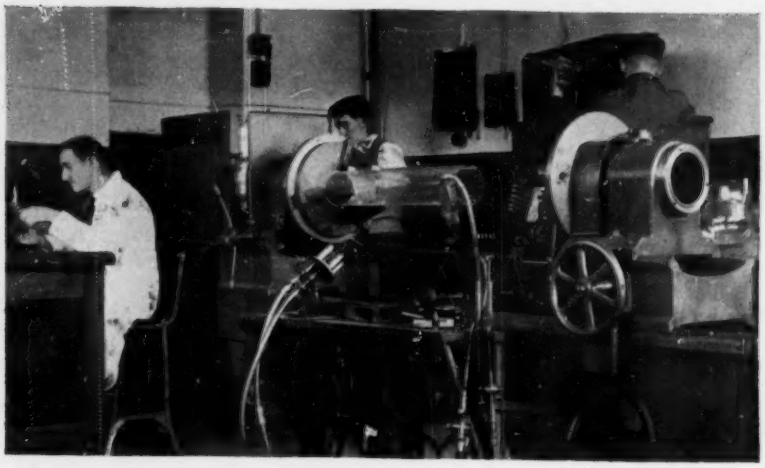
Causes of the reduced growth rate after the first do not appear to be fully understood. Depletion of soil factors has been ruled out. The investigators suggest that gibberellic acid may have some direct influence on re-growth, although it does not produce any permanent change in the composition of the sward.

Arable crop experiments indicate that although there was a greater growth of aerial parts of the treated plants, there was not an accompanying increase in crop yields. Similarly, the crop size of tomatoes, peas, runner beans and blackcurrants was not increased after gibberellic acid treatment. Also, in spite of stimulation of the growth of the tops, yields of root crops such as potatoes, turnips and carrots were depressed.

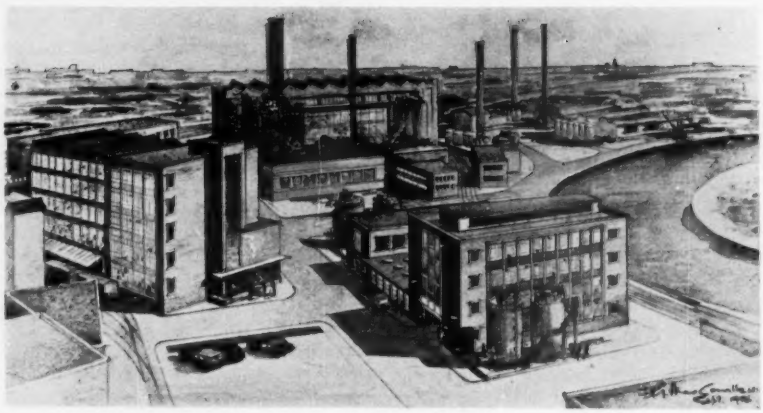
The investigators consider that if gibberellic acid could be used in practice it would only be of interest to the dairy farmer for the production of early- and late-season grass where conditions allow the herbage to be used efficiently.

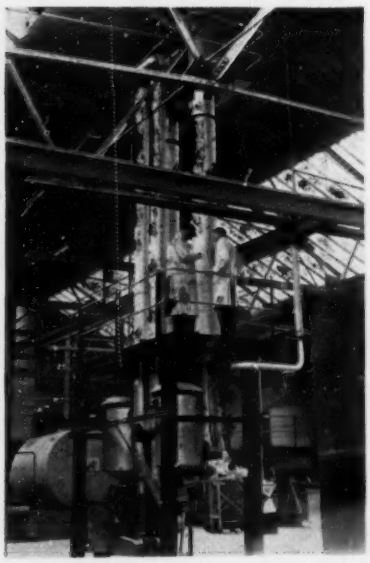
As total yields from gibberellic acid-treated swards are not increased it does not seem likely at this stage that the acid will have an economic value in grassland practice. However, while gibberellic acid used alone has not given improved yields, the additive properties of the acid and fertiliser may well be worth investigating as also continued application of gibberellic acid and fertiliser after a first cut has been made.

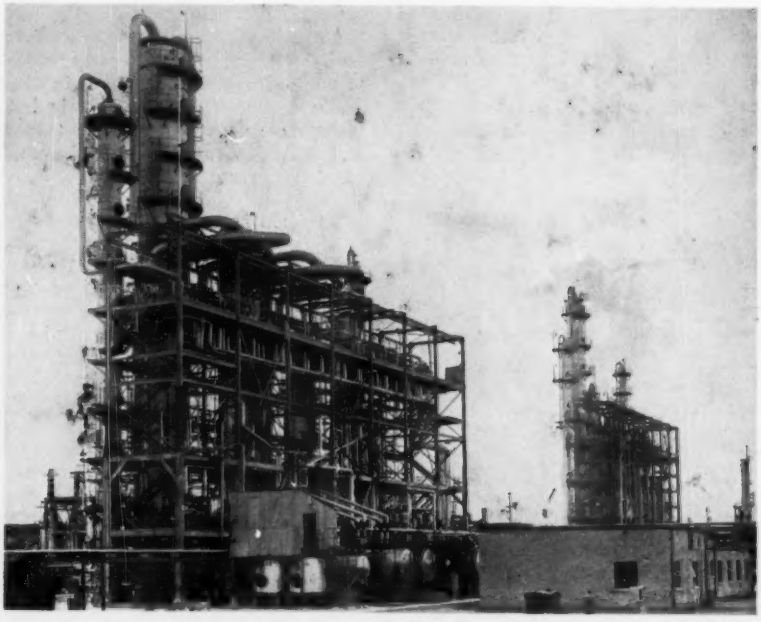
MORE PICTURES OF THE YEAR



Above: Glass-blowing shop for making experimental equipment at BORAD, which was formed on 1 October. Above, right: Alkathene being extruded at ICI Plastics Division's £500,000 technical service and development laboratories, opened in September. Right: architect's impression of the £5 million factory to be built by Joseph Crosfield & Sons Ltd. The company stated in November that it would take about eight years to complete. Below, left: concentration section of Associated Lead's Liverpool plant which started up in June. Below, right: new distillation area inaugurated at Grangemouth on 7 November by Forth Chemicals Ltd.







NOTE & COMMENT

CATALYSED NUCLEAR REACTION

A NEW KIND of nuclear reaction that yields energy and is akin to thermonuclear reactions is claimed by physicists working at the University of California. The work, which is described as catalysed nuclear reaction, has been reported by Dr. Luis W. Alvarez to the American Physical Society. The US Atomic Energy Commission states that the discovery 'adds to those reactions already known to science a new and third way of making a nuclear reaction take place.' The other two methods are to induce thermonuclear reactions in which two light nuclei fuse into a heavier one when the temperature is raised to about 1 m. degrees; and secondly, to bombard nuclei with other nuclear particles from accelerators such as cyclotrons or nuclear reactors.

The new method is described as 'a way of pulling two nuclei together so that a proton and a nucleus of heavy hydrogen (a deuteron) can combine to form helium-3 with the release of 5,400,000 volts energy.' This new discovery is at present only a laboratory phenomenon. It is stated by the Atomic Energy Commission that the chain of catalysed reactions cannot continue long enough to generate commercially useful amounts of power as mu mesons decay into other particles after two millionths of a second. The mu mesons can be made only in high-energy nuclear collisions of particles accelerated by cyclotrons and other expensive machines.

If, however, a much longer-lived particle is found with properties similar to that of the mu meson, there would be interesting possibilities. Evidence for such a particle has been reported by the Russian physicist Alikhanian.

An opinion given to THE CHEMICAL AGE following last week's brief reference (p. 10) suggests that the stage of usefulness of the new atomic reaction can be compared with the work of Sir John Cockcroft 30 years ago. It is also considered that it may well be up to 20 years before the reaction can serve a useful purpose.

GIBBERELLIC ACID AND GROWTH

RESULTS of larger-scale experiments with gibberellic acid on field crops of grass, wheat, roots etc., begun in July 1953 and continued for three years are reported by D. G. Morgan and G. C. Mees of Imperial Chemical Industries Ltd. (*Nature*, 1956, **178**, 1356).

Optimum rate of application of gibberellic acid was found to be 2 oz/acre of the acid in 100 gallons of water. Four to 10 weeks after treatment each plot was cut, the grass weighed, sampled for dry weight and crude protein (total nitrogen) determinations. Gibberellic acid was found to increase the growth rate of all components of the swards. The growth effects were observed even when there was little or no response to fertiliser alone. Nitrogen content was lowered by about 2 per cent after treatment so that yields per acre of crude protein were not increased to the same degree as the dry-weight yields.

Compared with nitrogenous fertilisers, initial growth response was more rapid. The difference persisted longer in spring and autumn when natural growth is slower. However, it is reported that eventually yields obtained with fertilisers were greater than those obtained with gibberellic acid. A temporary chlorosis accompanying increase of growth of the grass was observed. Normal green colour returned within six to eight weeks, or, if a nitrogenous fertiliser was applied together with the gibberellic acid, within a much shorter period.

It is of interest to note that yield increases given by gibberellic acid and fertiliser applied together, were additive. However, if after cutting the acid was not applied, the dry matter and crude protein yields at the second cut were depressed by approximately the amount of the increase at cut 1. Therefore, the total yield over the two cuts was not significantly increased.

Causes of the reduced growth rate after the first do not appear to be fully understood. Depletion of soil factors has been ruled out. The investigators suggest that gibberellic acid may have some direct influence on re-growth, although it does not produce any permanent change in the composition of the sward.

Arable crop experiments indicate that although there was a greater growth of aerial parts of the treated plants, there was not an accompanying increase in crop yields. Similarly, the crop size of tomatoes, peas, runner beans and blackcurrants was not increased after gibberellic acid treatment. Also, in spite of stimulation of the growth of the tops, yields of root crops such as potatoes, turnips and carrots were depressed.

The investigators consider that if gibberellic acid could be used in practice it would only be of interest to the dairy farmer for the production of early- and late-season grass where conditions allow the herbage to be used efficiently.

As total yields from gibberellic acid-treated swards are not increased it does not seem likely at this stage that the acid will have an economic value in grassland practice. However, while gibberellic acid used alone has not given improved yields, the additive properties of the acid and fertiliser may well be worth investigating as also continued application of gibberellic acid and fertiliser after a first cut has been made.

DIARY DATES

MONDAY 14 JANUARY

CS (Leeds Section)

Leeds: Chemistry Lecture Theatre, The University, 6.30 p.m. 'Problems of Air Pollution' by G. Nonhebel.

TUESDAY 15 JANUARY

I.Chem.E. (NW Branch)

Chester: The Grosvenor Hotel, 7 p.m. 'Vacation Training for Chemical Engineers' by A. J. Carter.

SCI (Chemical Engineering Group)

London: 14 Belgrave Square SW1, 5.30 p.m. 'The Use of Multi-wall Paper Bags in the Chemical Industry' by A. R. Hutchinson.

WEDNESDAY 16 JANUARY

RIC & SCI

London: King's College, Strand WC2, 6.30 p.m. 'The Chemistry of the Newer Elements' by Professor H. J. Emeleus.

RIC, SCI & CS

Manchester: Chemistry Lecture Theatre, The University, 6.30 p.m. 'Studies of Knock and Anti-Knock by Kinetic Spectroscopy' by Professor R. G. W. Norrish.

I.Chem.E. (NW Branch)

Leeds: The University, 7 p.m. 'Equilibrium Flash Vaporisation of Coal-tar and Coal-tar Fractions' by D. K. H. Briggs and F. Popper.

Bradford Chemical Society

Bradford: Technical College, 7 p.m. 'Application of Infra-red Measurements to Materials of Textile Interest' by G. Weston.

Manchester Metallurgical Society

Manchester: Manchester Room, Central Library, 6.30 p.m. 'Physical Chemistry in Extraction Metallurgy' by Dr. F. D. Richardson.

THURSDAY 17 JANUARY

Chemical Society

London: Burlington House, Piccadilly W1, 7.30 p.m. Meeting for reading of original papers.

Bristol: Chemistry Department, The University, 7 p.m. Joint meeting with RIC and SCI. 'Some Aspects of Radiation Chemistry' by Professor F. S. Dainton.

Sheffield: Chemistry Lecture Theatre, The University, 7.30 p.m. Joint meeting with the University Chemical Society and the RIC. 'Modern Inorganic Stereochemistry' by Professor R. S. Nyholm.

SCI (Food Group)

London: Courtauld Hall, Queen Elizabeth College, Campden Hill Road, 7.30 p.m. Buffet dance to celebrate 25th anniversary of the Food Group.

SAC (Scottish Section)

Glasgow: Rhul Resturant, 123 Sauchiehall Street, 1.30 p.m. Annual general meeting.

FRIDAY 18 JANUARY

Chemical Society

Aberdeen: Marischal College, 7.30 p.m. Joint meeting with RIC and SCI. 'The Character of Paint: Newer Developments' by A. T. Rudram.

Birmingham: Chemistry Department, The University, 4.30 p.m. 'The Structure and Chemistry of the Living Cell' by Dr. T. S. Work.

Southampton: Chemistry Department, The University, 5 p.m. 'Structure Relationships of Hypotensive Drugs' by Dr. H. R. Ing.

ICI Buys Estate

ICI LTD. has negotiated the purchase of the major portion of the Norton Priory estate between Runcorn and Stockton Heath in Cheshire from Sir Richard Brooke, Bart. ICI does not intend immediately to develop the land, which extends to more than 1,000 acres, but has in mind a long-term scheme of industrial development. The estate has been in the Brooke family since 1545 when Sir Richard Brooke, a Knight of Rhodes, purchased the priory from King Henry VIII following the dissolution of the monasteries. The baronetcy was created in 1662.

Synthetic Rubber Symposium

TO MARK the establishment of a synthetic rubber industry in Britain *The Rubber & Plastics Age* is holding an international synthetic rubber symposium at Church House, Westminster, London, on 26, 27 and 28 March. Arrangements have been made for 12 papers to be read. Application forms are obtainable from *The Rubber & Plastics Age*, Gaywood House, Great Peter Street, Westminster, London SW1.

Chemical Engineering

A SYMPOSIUM on chemical reaction engineering will be held in Amsterdam on 7, 8 and 9 May under the auspices of the European Federation for Chemical Engineering. Papers will be delivered on aspects of the following subjects: 'Transport Phenomena in Heterogeneous Reactions,' 'Non-uniform Concentration Distributions,' 'Reactor Efficiency and Stability,' and 'Reactor Development.'

Preprints of the papers will be issued to subscribers.

Concrete Floor Coating

Product Available in Range of Three Colours

A FLOOR COATING which, so it is said, penetrates into concrete, stone and similar floors to give a durable surface, was demonstrated on 7 January by South American Minerals & Products Co. Ltd., London EC1. The coating, which is known as Exon, is available in three colours and is brushed or sprayed on to the surface. It becomes touch dry in 30 minutes and can be walked on after three hours; the finish dries semi-matt and has a non-slip effect.

Exon is said to prevent surface disintegration of concrete and to be resistant to acids and alkalis of moderate strength and to oils. No thinners, other than water, are required. The coating is understood to have a polyvinyl base emulsified in water. It is a fire retardant and can be applied to interior and exterior surfaces.

Additions to KID

AMENDMENT No. 12 of the Safeguarding of Industries (List of Dutiable Goods) Order, 1957, has been made by the Board of Trade. Published as Statutory Instruments, 1957, No. 2, the order, which lists 81 chemicals, may be obtained for HM Stationery Office, Kingsway, London WC2, price 3d, by post 5d, or through any bookseller.

Automatic Measurement

A CONFERENCE on 'Automatic Measurement of Quality in Process Plants' will be held by the Society of Instrument Technology at University College, Swansea, from 23 to 26 September 1957. In order to provide as far as possible a balanced survey of the field of automatic measurement of physical and chemical properties in the process industries, papers have been invited from a number of authorities, but offers of other contributions will be welcomed. Brief details should be sent as soon as possible to the secretary of the Society, 20 Queen Anne Street, London W1.

Anti-foam Agents

NOBEL division of Imperial Chemical Industries has published a booklet, *Silicones for Foam Prevention*, which describes the uses of ICI silicone anti-foam agents in brewing and fermentation processes, as well as in the manufacture of synthetic resins, adhesives, paper, paints and varnishes.

Amounts of from one p.p.m. upward of silicones are claimed to be effective in preventing foaming.

CHEMICAL PIONEERS

1 John Roebuck

This is the first article in a series on the pioneers of chemical industry. The author is Dr. D. W. F. Hardie, who is well known as a historian of the Industrial Revolution and of the chemical industry. It is believed that the series will be of particular interest to students as well as to older readers in this country and overseas

JOHN ROEBUCK was born in 1718, the son of John Roebuck, a Sheffield cutler. He received his early education at Northampton in an academy presided over by the non-conforming divine, Dr. Philip Doddridge, author of 'O God of Bethel.' As a dissenter, Roebuck was not eligible for admission to the Universities of Oxford and Cambridge. Like many young men of his time and class he sought the more liberal climate of Scotland, and entered upon the study of medicine at the University of Edinburgh; he continued his studies at Paris, and gained his medical diploma at Leyden in 1743. At Edinburgh Roebuck became acquainted with contemporary chemistry in the classes of Andrew Plummer.

Sometime during the three years in which Roebuck practised as a physician in Birmingham he became interested in refining precious metals and began experiments in his private laboratory. Sulphuric acid was required for the refining process and, with a Birmingham business man, Samuel Garbett, one year his senior, he embarked upon manufacture of the acid for sale to the refining and other metal industries in the locality.

Early Processes

At this time the established process for making sulphuric acid consisted in repeatedly burning small quantities of brimstone mixed with nitre under a glass bell, the gaseous sulphur oxides being absorbed in a shallow layer of water. Acid thus produced would have cost up to £280 a ton, had this laborious procedure permitted manufacture on a tonnage scale.

It is now beyond inquest to discover the steps by which Roebuck and Garbett arrived at their revolutionary decision to construct their 'acid houses,' as they called them, of sheet lead. Roebuck was probably acquainted with Glauber's recorded observation that lead is resistant to the action of sulphuric acid. The chambers which Roebuck and his partner erected in 1746 at their works in Steelhouse Lane, Birmingham, took final form as structures having a 6 ft. by 4 ft. base, cast in one piece, to which were riveted walls of sheet lead 8 ft. high, the whole being supported by an external wooden framework secured to the wall of the building.

In chambers of this size, about 740 lb. of 33 per cent acid could be produced in the course of a month. Strong acid—'oil of vitriol'—was made by heating the 33 per cent acid in 1 ft.-deep lead pans. By their choice of lead as the material of construction of the plant, Roebuck and Garbett opened up the prospect of manufacturing sulphuric acid on a tonnage basis, and thereby inaugurated the chemical phase of the Industrial Revolution. Increased scale of manufacture almost immediately reduced sulphuric acid to a quarter of its former price, and considerably before the end of the 18th century the normal price was about £20 a ton.

Second Acid Works

Roebuck and Garbett in 1749 erected a second acid works at Harlawhill, Prestonpans, near Edinburgh. It is very probable that they knew the acid was being used as a sour in linen-bleaching, and that quantities were being imported into Scotland from England and Holland for this purpose. The Prestonpans vitriol works may ultimately have had as many as a 100 chambers of slightly larger dimensions than those originally erected in Birmingham; if so, its production of 33 per cent acid was of the order of 500 tons a year.

For 24 years—remarkable as it may appear—Roebuck entertained the hope of keeping secret the fact that lead was used in the construction of his plant. By 1770, and probably much earlier, the secret was out, and a number of manufacturers, including a well-known firm of Scottish calico-printers, installed lead chambers. When Roebuck and Garbett sought to defend their hastily-filed Scottish patent of 1771 it was found to be invalid on the ground of previous use of the invention in England by the inventors themselves.

Sulphuric acid manufacture was not Roebuck's only industrial venture. In 1760 he was the moving spirit in the founding of the Carron Iron Co. Nine years later he sponsored for a short time the development of Watt's improved steam engine, mainly in the hope that it would prove more efficient than the Newcomen type for pumping water from a mine he had acquired to provide coal for the Carron works. With Watt, Roebuck may also have made tentative experiments in the synthesis of alkali from common salt—a problem then engaging the attention of the Lunar Society of Birmingham, of which Watt was a recently joined member.

Failure in 1772 of the London banking house of Neal, James, Fordyce & Down gravely affected Roebuck's financial position. He had to sell to Matthew Boulton his two-thirds share in Watt's engine patent. Garbett, who took over entirely the Birmingham acid works, also purchased the greater part of Roebuck's shares in the Carron Co. Eventually, the Prestonpans vitriol works passed into the control of John Glassford, a Glasgow 'tobacco lord' and financier.

Roebuck spent the last decade of his life in obscurity and inaction. He died in 1794, virtually in poverty, leaving his widow a pensioner on the charity of his successful former associates. Few men in the history of chemical technology have effected a more fundamental and momentous advance, and few of the great pioneers have left a more slender legend of their life and personality than Dr. John Roebuck.

Works Extensions

SUBSTANTIAL extensions are to be made to the plant of Henry Balfour & Co. Ltd., Leven, Fife. It is also proposed to construct a major central laboratory there to handle research work for the Balfour group of companies.

As a result of a visit made by the chairman of the company, Mr. W. Lindsay Burns, to the US and Canada, contracts have been obtained in the oil industry and natural gas fields.

In the course of his visit, which lasted six weeks, Mr. Burns visited all the major buying points in the North American market.

WILLS

DR. FRANK WILLIAM CROSSLEY-HOLLAND, M.P.S., F.C.S., chairman of the British Pharmaceutical Conference, 1935, who died on 27 August last, intestate, aged 78, left £14,114 1s 11d gross, £13,583 5s 6d net (duty paid £931).

MR. JOHN WILLIAM CRAGGS, of 9 Elgy Road, Gosforth, Northumberland, chairman of Robert Bowran & Co. Ltd., paint manufacturers, for many years secretary of the Institution of Chemical Engineers, who died on 23 August last, left £21,752 3s 5d gross, £20,787 13s 1d net value (duty paid £2,944).

People in the NEWS

● MR. E. D. WHITELOCK and MR. R. W. L. RAMSDEN have retired from the board of Brotherton & Co. Ltd. MR. C. L. EVANS has joined the board as director in charge of production. Mr. Whitelock joined the company in 1913 as chief engineer and became a director in 1943. Mr. Ramsden joined the company as works engineer at the Birmingham works in 1915, was later appointed manager there, and became a director in 1953.

● The appointment of MR. E. HARTLES as commercial director of McKechnie Bros. has been announced. MR. H. F. JAMES has been appointed technical director and MR. H. R. WHITTY has resigned from the board. Mr. Hartles has been with the company for 36 years and has been a departmental (raw materials) director for six years. He will continue to look after the raw materials side of the business from Birmingham. Mr. James will be at head office, Widnes.

● MR. D. RIDER has resigned his position as joint managing director and has retired from the board of Woodall-Duckham Construction Co. Ltd., but retains his directorship of the parent company. Woodall-Duckham. MR. F. P. DYSON has been appointed joint managing director of Woodall-Duckham Construction Co. Ltd., and MR. C. D. MUNTZ and MR. E. N. WENBORN have been appointed directors.

● Wild-Barfield Electric Furnaces Ltd. announces MR. J. E. ORAM, director and general manager, is now managing director of the company. The composition of the board of directors is unchanged; MR. G. R. BARCLAY is chairman and DR. F. W. HAYWOOD technical director.

● The Distillers Company Ltd. has appointed MR. C. E. HOLLIS, B.Sc., F.R.I.C., to be deputy controller of research and development.

● The Society's Medal of the Society of Chemical Industry, which is awarded not more than once every two years for conspicuous services to applied chemistry or to the Society, has been awarded for 1957 to MR. WALTER J. WORBOYS, a director of ICI Ltd.

● To mark the centenary of his birth, the directors of Acheson Colloids Ltd. have commissioned a portrait in oils of Dr. Edward Goodrich Acheson, founder of the Acheson organisation. The painting, executed by Mr. W. E. Webster from a photograph, will be officially presented to Mr. Howard A. Acheson, president of the Acheson organisation, at a private ceremony to be held in London. The painting will then be moved to its permanent home in New York.

● MR. L. B. LAMBERT, general sales manager of Negretti & Zambra since 1938, has relinquished this position to take up the post of overseas manager of the company. MR. ARTHUR MUIR, previously the company's Northern area manager, has been appointed to the position of home sales manager and is now based at head office in London. MR. R. L. SPILLER has recently taken up the appointment of chief technical correspondent, replacing MR. HAYDN GREEN who has left the company.

● MR. J. L. N. POLLOCK, a director of the Esso Petroleum Co. Ltd. since 1938, has retired from the board after completing 37 years' service with the company. He has also relinquished his directorships of subsidiary companies of the Esso group. MR. D. A. C. DEWDNEY, manager of the co-ordination and economics department, has been appointed a director.

● The British Welding Research Association announces the appointment of MR. H. F. TREMLETT, B.Sc., A.R.S.M., as deputy director of the Association from 1 February.

● Six local directors have been appointed by Thos. W. Ward Ltd., Sheffield. They are: ERNEST SPRINGTHORPE, C. NORMAN BRADSHAW, ERIC WOLSTENHOLME, GEORGE PAGE, REG. HADFIELD, and ALFRED KISSACK.

● After service of nearly 39 years with British Oxygen, MR. EDGAR S. LANE has retired from the post of northern area sales manager (medical division). Mr. Lane will be succeeded by MR. FREDERICK B. STEPHENS, the assistant area sales manager.

● President of the Royal Society has appointed the following vice-presidents for the year ending 30 November 1957: SIR DAVID BRUNT; PROFESSOR G. L. BROWN, C.B.E.; SIR CLAUDE GIBB, K.B.E.; SIR BRYAN MATTHEWS, C.B.E.

● MR. L. E. MILLS has been appointed a director of British Tar Products Ltd., as from 1 January 1957. Mr. Mills joined the company in 1924 and recently became commercial manager which position he continues to hold.

● Chairman of London County Council for 1957-58 will be MR. RONALD MCKINNON WOOD, chairman of Griffin & George Ltd., laboratory furnishers and scientific instrument manufacturers. Mr. McKinnon Wood takes office in April.

● MR. D. P. C. NEAVE, who has been a director of Fisons since 1946, has been appointed deputy chairman of the company.

● New directors of British Drug Houses are MR. L. T. LE G. BURLEY, general manager of the laboratory chemicals group, and MR. F. W. GRIFFIN, at present managing director of British Drug Houses (India).

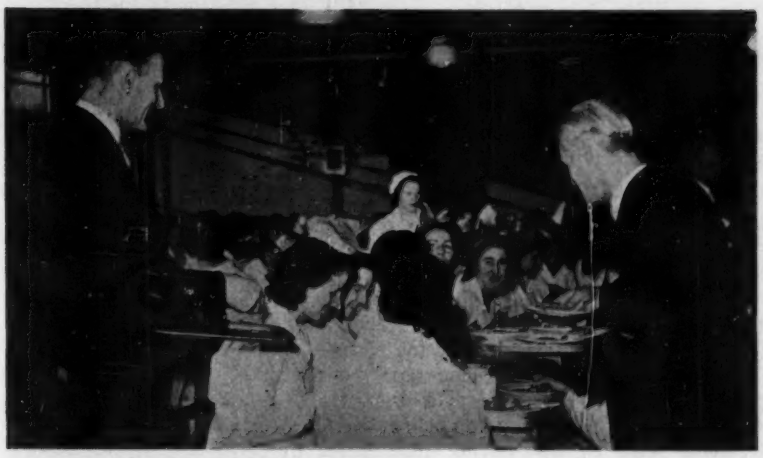
● MR. G. H. BEEBY has been appointed chairman of British Titan Products Co. Ltd., York, in succession to DR. G. I. HIGSON who relinquished his appointments as a director and chairman of the company on 31 December.

● PROFESSOR P. M. S. BLACKETT, professor of physics at the Imperial College of Science & Technology, London, was formally installed as president of the British Association for the Advancement of Science at a meeting at Birkbeck College, London, on Friday of last week, 4 January.

● Ferranti Ltd. announces the appointment of MR. C. M. L. WALKER as sales consultant in the Midlands. MR. R. S. WINTER has been appointed area manager in succession to Mr. Walker.

SEASONABLE CELEBRATIONS

Works Dinner at Warner Laboratories, Eastleigh



EMPLOYEES of William R. Warner & Co. Ltd., Eastleigh, Hampshire, were entertained to a Christmas dinner by the company on 21 December. This photograph shows two of the 'waiters' busy at table. On the left is Mr. P. G. E. Warburton, Warner's chairman and managing director; on the right Mr. F. W. Diss, head of the inspection department, handles his tray in masterly style. Warner's laboratories at Eastleigh were opened by Lady Pamela Berry on 8 June. They cover 102,000 sq. ft. and represent the first stage in the concentration of the British manufacturing activities of the Warner-Lambert Pharmaceutical Co. A description of the premises was published in THE CHEMICAL AGE of 16 June 1956.

NEW DISPLAYS AT SAFETY CENTRE

BY COURTESY of the director of the Industrial Health and Safety Centre, Horseferry Road, London SW1, the following record is published of new exhibits added to the Centre's display:

Exhibits: Adjustable stool and chair, H. R. Turner & Co., Willenhall; dusk mask and three types of goggles, Safety Service Co., London W14; cutter for use on a bumper press, fitted with safety device to prevent tipping, Boots Pure Drug Co. Ltd., Nottingham; one-piece hack-saw frame, easily adjustable with eight blade positions, Rolls Tools Ltd., London SE1; stud-driving tool, cartridge operated with safety devices; also display case of studs, Langham Export Co., London W1; drum for carrying cables of portable tools fitted with two socket outlets, Wolf Electric Tools Ltd., London W5; separate metal foot rests for use with seats, Mullard Radio Valve Co., Mitcham; emergency kit for use in cyanide poisoning, Cuxson, Gerrard & Co., Oldbury, Birmingham; selection of gloves for replacement, Chichester Rubber Co.; factory forms laminated between sheets of Bakelite, Bakelite Ltd., London; display board of guarded electrical conductors for overhead work, British Insulated Callenders Cables Ltd., Prescot; adjustable clamps for work on machine tables, Rockwell Machine Tool Co., London NW2; two adjustable seats with spring suspension, Cowtan & Cox, West Croydon; bread roll cutting machine; eight pint stainless steel teapot with infuser, Benham & Sons Ltd., London W1; fluorescent battery hand lamp, Process Control Gear Ltd., St. Albans; CO_2 fire extinguisher and a fume extinguisher, Firesnow Ltd., Macclesfield; earth leakage circuit breaker testing unit, Siemens Brothers Co. Ltd., London SE18; cellophane bags for sandwiches, Coldense Ltd., London W1; iron for sealing Cellophane bags, Theco Electrical Appliances Ltd., London WC1; mouth operated fog horn as a fire alarm, Graham Bun (Wroxham) Ltd., Wroxham; Klaxon fire alarm, Klaxon Electrical Engineers Ltd., London W1; fire alarm bell, Edgar C. Burrell & Sons, Great Yarmouth; fire gong and sounder, Merryweather & Sons Ltd., London SE10; fire alarm bell, Beatties of Southgate, London N14; hand operated fire syren, Leach Electrical & Engineering Co., London SW1; special double arrow fire sign, De Havilland Propellers Ltd., near Bolton; fire operated alarm for small factory or house, Evered & Co. Ltd., Smethwick.

Chemical Sealer

Rubber-Modified Epoxy Resin Based Product by Genolite

FOLLOWING a long development period, Genolite Ltd., 13-17 Rathbone Street, London W1, have now evolved a new chemical sealer, Code CS 14. This material is based on a rubber-modified epoxy resin and is stated to possess marked powers of resistance to almost every type of corrosive media found in factories, on building sites and at sea.

In combination with Jenolite RRN it is believed that the new product provides steelwork with an anti-corrosive pre-treatment which is much more effective than any treatment available to date. Jenolite CS 14 is described as being impervious to moisture and highly resistant to acidic and alkaline attack. It is said to remain unaffected by ketones and by mixed aliphatic hydrocarbons.

The sealer coating pre-cures in 24 hours and can be overpainted with any type of primer and paint after this period. Full coating strength and flexibility is reached after seven days, after which it withstands temperatures of up to 150°C.

Jenolite CS 14 is grey in colour and is marketed in a twin-pack system comprising a one-gallon tin of base and a half-gallon tin of hardener. It can be applied by brush or spray, has a coverage well over 300 sq. ft. per gallon and is non-toxic.

Technological Studies

THE *Bulletin of Special Courses in Higher Technology*, part II, published by the Regional Advisory Council (London and Home Counties) for Higher Technological Education is now available.

Purpose of this bulletin is to give publicity to special advanced courses which do not regularly appear in college calendars, or prospectuses, as part of a group course, or as subjects offered for endorsement on Higher National Certificates.

Copies of the bulletin are obtainable from the Secretary, Regional Advisory Council, Tavistock House South, Tavistock Square, London WC1, price 1s 6d.

Plastics Exhibition

IT IS UNDERSTOOD that at the International British Plastics Exhibition to be held in the Grand and National Halls, Olympia, from 10 to 20 July next year, plastics manufacturers from eight countries, including the UK, the US, Germany and France will be exhibiting.

Instrumentation in the Chemical Industry

Special contribution

THIS article does not indulge in dramatic speculation about instrumentation; it deals with what has been accomplished and makes a suggestion of likely developments.

The advanced state of present-day instrumentation can probably be appreciated best by studying briefly its evolution during the last 30 years. After the first world war industrial instruments consisted mainly of those used for simple measurements and for indicating and recording process conditions. These instruments were mounted near the valves by which the plant operators manually regulated the process variable. This involved a number of operators each engaged in a boring and monotonous job, often exposed to the weather or in an unpleasant or even dangerous location.

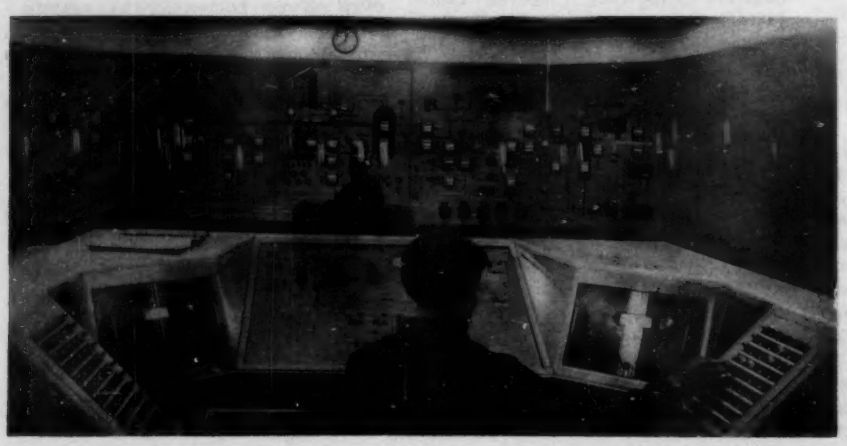
First main improvement was the grouping of instruments on a central control panel. This could be housed in a relatively safe and congenial place, with associated flow meters, pressure gauges and valves arranged together. Impulse lines filled with the medium being measured were used to connect the point of measurement with the control panel. This was not good practice—especially if a line became disconnected, fractured or developed a leak.

The introduction of pneumatic transmission—which is described more fully later in this article—overcame this hazard, so that the tubes connecting the point of measurement with the panel instruments only contained low-pressure compressed air.

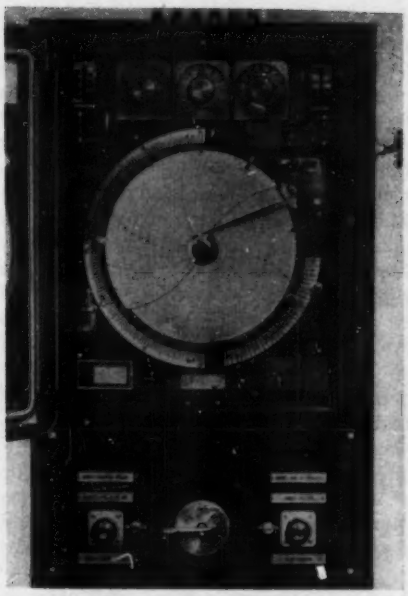
As plants grew more complex, panels became larger. Some panels reached a length of 100 ft. or more. This arrangement was unwieldy and inconvenient; hence the development in recent years of the miniature instrument. Though possessing adequate accuracy and efficiency, it takes up far less space than its conventional counterpart. Many may be mounted on a panel of reasonable size or on a control desk or console. A further advantage of miniature instruments is that they can be mounted on a panel of the modern graphic or mimic type. The instruments, in their correct relative positions and superimposed on a coloured diagramatic flow sheet of the process, clearly show the arrangement of the plant under control. The control room can be pressurised to prevent the ingress of air carrying dirt, dust, damp or contaminating gases that might harm the instruments. Instruments for automatic control, which were uncommon during the 1920s, became more numerous during the next 10 years, and then made rapid strides both in number and performance. Thus the widely-used automatic controllers of to-day have a high degree of efficiency.

Pneumatic system of instrumentation is the most widely used in the chemical industry. In order to study its function and indicate its possibilities, its operation will be described taking as an example a case of the measurement of fluid flow through a pipeline. It is assumed that the rate of flow is to be indicated and recorded on instruments on the centralised panel, and also indicated on a repeater instrument near the valve for convenience in local control. The measuring unit senses the rate of flow, and impulses are conveyed to a nearby pneumatic transmitter. This converts the impulses representing the rate of flow into an output air pressure, which also varies according to the rate of flow.

Pressure of output air is conveyed by small bore tubing to the indicator on the centralised instrument panel, situated probably at a distance. Though only a pressure gauge, actuated by air pressure from the transmitter, the instrument can be calibrated in suitable units so that the rate of flow can be read directly in gallons per minute or per hour. The same air pressure operates



Part of the control panel of the fluid catalytic hydroformer at the Esso refinery, Fawley. Miniature recording and controlling instruments are let into the panel at positions corresponding to those at which they operate on the plant. Photo by courtesy of Esso Petroleum Co. Ltd., Westminster, London SW1



Air-operated programme controller. Below, right: diagrammatic representation of the 'closed loop' system of automatic control. Illustrations by courtesy of Negretti & Zambra Ltd.

the recording instrument on the panel, as well as the indicator near the valve.

The procedure is basically the same whatever variable is measured, each variable requiring a suitable measuring instrument. After being measured the variable is converted into an equivalent air pressure, which is transmitted to the reading instruments. This is why a transmitting instrument is sometimes referred to as a pneumatic converter. Source of compressed air can be a compressor or factory mains. It is important that the air should be clean and dry, and capable of being reduced to a pressure usually of 20 or 30 lb. p.s.i.

Many pneumatic transmitters or converters operate on the 'force balance' principle, i.e., the force produced by the variable or physical conditions being measured is balanced by a force produced by the compressed air. The value of the balancing force is measured and interpreted in the units of the variable. Utilisation of the 'force balance' principle enables instruments of high precision and efficiency to be made. In some types the maximum movement of any part during operation is only .002 in. The effects of inertia, hysteresis, wear and friction are non-existent.

One of the outstanding advantages of the pneumatic system is its versatility. It may be used to measure, for instance, the flow of practically any fluid from light gases to heavy or viscous liquids or slurries, at high or low temperatures and pressures, and corrosive in action.

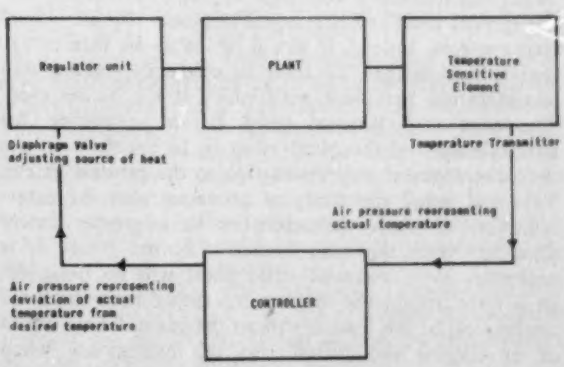
The inception of automatic control was a logical development from the use of instruments for measurement. Having evolved a means of measuring process variables to close limits, it was apparent that some means of maintaining them to such limits would be advantageous, because the object of installing automatic control is to reduce fluctuations in operating conditions to the minimum, except when changes are made intentionally. In practice there are continuous very slight fluctuations in operating conditions in plant under automatic control, and under correct operating conditions they are rectified at once.

A complete explanation of the method of operation of the automatic controller is obviously impossible in the scope of this article, but a brief outline may be of interest. The principle of operation usually follows closely the accepted type of 'closed loop' system in which the closed loop incorporates four elements—the plant, with which is associated the medium of which a process variable is to be controlled; the measuring element; the controller itself; and the regulating unit. The whole system can be air-operated, the compressed air being obtained from the same supply as in the case of the pneumatic transmitter.

In a simple case of automatic process control, such as the control of the rate of flow of fluid through a pipeline, the measuring element, which senses or measures the rate of flow of the fluid, is used in conjunction with a pneumatic transmitter, this in effect converts the rate of flow into an output air pressure. This output air pressure is conveyed by small bore tubing to the controller. The controller simultaneously compares this pressure with another imposed air pressure, representing the desired rate of flow, and produces an output air pressure the value of which depends on the amount of deviations of the actual rate of flow from the desired rate of flow. This output air pressure from the controller is conveyed by tubing to the regulating unit—a control valve usually of the diaphragm type. Depending on the value of this air output pressure, the diaphragm valve will open or close and so allow more or less fluid to flow along the pipe, until the desired rate of flow—as sensed by the measuring element—is obtained. Thus the 'closed loop' is completed. There is usually provision for adjusting from the control panel the air-pressure that represents the desired value of the variable, and also a means of operating manually the diaphragm valve by the adjustment of an air pressure, in case of failure or during servicing of the automatic control system.

The application described above is a simple example, and when plant or processes are more complex the system is naturally more complicated. But so adaptable and flexible is modern instrumentation that it seems well able to provide highly efficient and co-ordinated control action, however extensive or complicated the plant.

Thus in an oil refinery the rate of crude oil through the pipes of the furnace must be controlled to within a narrow margin; the temperature to which the oil is heated must be held within close limits; the correct temperatures in the fractionating tower must be maintained constantly, as must the temperature of the liquids which run down and over the various fractionating trays. The liquid through the heat exchangers must



INSTRUMENTATION

be carefully regulated both in rate of flow and temperature. There will be a further complex system of instrumentation and automatic control in connection with the catalytic cracking unit, concerned with the rates of flow, temperature, pressure and liquid level. All the recording instruments and some of the indicating instruments will probably be grouped on one or more panels, or on a control desk or console in a control room, so that an overall picture of the operation of the plant can be gained with ease and speed. Although it must not be implied that all the instruments and controls in a refinery will be operated solely by pneumatic means, it is in such applications that one of the advantages of this system is found to be of the greatest value—that it does not give rise to the slightest risk or hazard of fire or explosion when used in an atmosphere that may be highly inflammable.

Forms of Control

Many processing controllers incorporate more than one form of control—in addition to the simplest, that is, proportional control, in which the movement of the final control element (e.g. the diaphragm valve) is proportional to the deviation of the actual value from the desired value, they may include integral control, which, in brief, simplifies control when the load is changed, and the derivative control which takes into consideration the rate of change of the value from the desired value. Also, one controller can be made to work in conjunction with another, in cascade, so that the first alters the desired value of the second, according to conditions affecting the first.

Of great value in batch processes in which the procedure of adjustment of process variables follows a definite time cycle, is the automatic programme controller. In many instruments of this type the change in the desired value is made by means of a specially cut cam. When the cam revolves slowly the profile moves a lever with which it is in contact, and which in turn changes the setting point. In recently developed instruments, however no cam is required—the rates of temperature rise in degrees per minute and the holding periods are imposed by settings according to calibrated scales. Thus programme setting is quick, simple and highly flexible so that the programme can be changed at will in a matter of seconds.

It is obvious that instrumentation applied to processes has reached a very high degree of efficiency, and has proved itself as being equal to practically all normal requirements. Indeed, it would probably be true to say that it has reached its limit in efficiency, taking into consideration the plant with which it has to be used. The next step forward must lie in improving the controllability of the plant—that is, to enable it to use the advantages of instrumentation to the greatest extent. This will entail the study of processes and the determination of plant characteristics to a greater extent than has been the case hitherto. In the future it is probable—even essential—that plant will be designed, as it were, round the instruments rather than the mere application of the instruments to the plant. The wisdom of envisaging the fullest use of instruments when designing and installing new plant and modifying the design accordingly is already widely recognised.

Another factor that will greatly increase the usefulness of instrumentation is the widening of the capabilities of measuring instruments. Types that measure or sense the value of process variables or physical conditions such as rate of flow, temperature, level and so on have been in use for a long time. But what has not yet been developed is a measuring element capable of evaluating product quality. Though readily detectable by the eye, nose, tongue or touch of the expert, measuring elements possessing such critical faculties are yet to be devised. The usefulness of such elements is obvious, in that they would be used in conjunction with a master-controller for adjusting the setting-points of all the other controllers in order to produce a product of a pre-determined uniform quality. There is a growing practice of developing rapid methods of laboratory analysis for this purpose, such as the use of infra-red spectrometry, mass spectrometry, gas chromatography, automatic titration and distillation and other techniques, but much work remains to be accomplished.

The attitude of management towards instrumentation is essentially commercial. Does it pay? This answer must be in general terms, for probably no two plants are completely alike, and what applies to one may not apply to another. But the obvious inference from the extremely wide use of instrumentation is that it does pay and pays very handsomely. In fact, many installations have effected economies to the extent that they have paid for themselves in six months.

Economies Effected

Instrumentation is able to effect economies in several ways, some of which have been mentioned earlier in this article. But to take a surprising, though not uncommon, instance some manufacturers have found as a result of the introduction of instrumentation that the manufacture of some products was not profitable. They found after measurement that the cost of steam, water and fuel was far too high. Therefore the manufacture was discontinued, or the selling price adjusted—or more instrumentation was installed to enable the product to be made more economically.

In the matter of reducing labour by the installation of instruments for automatic control, the prime reason for their installation should be that they are able to do the work better, more precisely and more consistently than a team of operators, however experienced or conscientious. To look at the matter from any other point of view—that is, how much labour will be saved is both fallacious and dangerous. It is never completely possible to envisage beforehand how many operators will be displaced. In introducing automatic control, a number of operators—if sufficiently experienced or suitable for training—can be upgraded for more interesting and rewarding duties, such as maintenance. To state blandly that automatic control puts instruments in the place of men is incorrect and has caused enough industrial unrest already. Rather should instrumentation be looked upon as a means of making more and better goods cheaper, which can only be to the benefit of purchasers, workers, management and the nation.

INDIAN *NEWS*LETTER

by Our Special Correspondent

A COAL council has been set up by the Union Government in the Ministry of Production to study the various problems connected with the utilisation of coal resources and coal demand of metallurgical and other industrial purposes and the requirements of coal-based chemical industries.

The Government has set up a Mica Export Promotion Council for promoting the exports of mica, mica manufactures and by-products of mica industry. It will also be in charge of maintaining the standards and quality of mica and mica-products exported.

At the last meeting of the Governing Body of the Council of Scientific and Industrial Research, it was decided to establish a number of regional research laboratories to examine scientific and technological problems peculiar to each region. As a first step, the Central Laboratories for Industrial Research, Hyderabad, have been taken over by the Council and have been renamed the Regional Research Laboratory, Hyderabad. It was also decided to establish a well-equipped and well-manned institute for designing and fabricating pilot plant. A planning committee has been set up to work out the details. Two other committees were also constituted to prepare project schemes for the establishment of a Public Health Engineering Research Institute and an Aeronautical Research and Development Centre.

New Inventions

The second annual report of the National Research Development Corporation for the year ending 31 March 1956 shows that 243 inventions and new processes were reported to it for necessary action. Twenty-five research institutions including the national laboratories were responsible for most of the inventions: private individuals contributed 11.

Some of the projects licensed by the Corporation have gone into production. These include thermocouple ammeters, and composite protein food. Production of carbon brushes and slabs, nicotine sulphate, and carbions (an ionexchange resin developed from coal) is expected to commence shortly.

To provide research institutions and industry with information and basic data of economic importance and commercial significance, a survey and statistics section has been set up by the Corporation.

A programme for the manufacture of soap on a cottage industry scale employing non-edible oils available in the country has been approved by the Government of India. A grant amounting to Rs. 46 lakhs has been made to the All-India Khadi and Village Industries Board for implementing the programme. The project envisages the setting up of 165 oil crushing and soap-making units. A production subsidy on neem (*Melia azadirachta*) and other non-edible oils at the rate of one anna per two lb. has been granted. A sum of Rs. 25,000 has been provided for conducting research on non-edible oils for use in soap making.

Non-edible Oils

Though reliable data on non-edible oil resources in the country are not available, their contribution to overall production of oil seeds is considered significant. Madras State alone is reported to produce about 160,000 tons per annum comprising *Melia azadirachta*, *Pongamia glabra* and *Madhuca latifolia* seeds. A survey of oilseeds and nuts other than commercial edible oil seeds in Bombay State has revealed over 38 species of plants producing considerable amounts of oil-bearing seeds containing about 16 to 50 per cent of oil.

To establish the practical possibilities of the laboratory investigations conducted at the Forest Research Institute, Dehra Dun, on the preparation of copper chlorophyll (Indian Patent No. 47655) the National Research Development Corporation of India has decided to sponsor a project at the Shri Ram Institute for Industrial Research, Delhi. It is aimed to produce 1 kg. of copper chlorophyll per day and also obtain data on yields, process losses and other economic aspects of the process.

India imports 800-1,000 lb. of chlorophyll from the UK and Switzerland at Rs. 40 per lb. for the oil soluble variety and Rs. 250 per lb. for the water-soluble product.

A Committee has been set up by the National Research Development Corporation to examine a project for the manufacture of Coalene, an ashless carbon from coal, developed by the Central Fuel Research Institute, Jealgora. This will involve an expenditure of Rs. 1.5 lakhs per annum for two years. The product has been found suitable for the manufacture of carbon electrodes and other carbon products for the electrochemical industries. It is estimated that 20,000 tons of this material will be required for the production of electrodes alone.

Plans for setting up a sugar factory at Belgaum (Bombay State) and another at Madras are being completed. The capital outlay for the Belgaum factory is estimated at Rs. 75 lakhs. The Madras factory, which is to cost Rs. 50 lakhs, will be supplied with plant and machinery by the Polish Machinery Corporation.

Fertiliser Exports

DURING the first nine months of 1956, Italian exports of chemical fertilisers totalled 443,575 tons valued at 14,100,000,000 lire. There is thus an increase of 22.3 per cent in quantity and an increase of 19.3 per cent in value compared with the corresponding period of 1955 (362,552 tons for 11,900,000,000 lire).

Very large increases have occurred in the case of exports to China (338 per cent), and India (114 per cent), while smaller increases have been recorded in the case of Austria (33 per cent), and Yugoslavia (10 per cent). Lower exports of Italian chemical fertilisers to Greece (87 per cent), US (80 per cent), and Egypt (50 per cent), however, are reported.

High Vacuum Pumps

SOME NEW MODELS of high vacuum pumps have been developed by the Pulsometer Engineering Co., Nine Elms Iron Works, Reading, Berkshire. Model 300 is a further single stage conventional oil sealed high vacuum pump which despite a large capacity of over 300 cubic feet per minute, is stated to be able to produce ultimate pressures of the order of 5 microns. Due to a special balanced designed, this unit is particularly free from vibrations.

Available shortly over a range of from 20 to 100 cubic feet per minute is a high vacuum pump for all chemical applications which is specifically designed to be acid resisting. The pump can be operated with any fluid as the sealing medium with the additional characteristic that this particular fluid need not have lubricating properties.

The Pulsometer Engineering Co Ltd., has also produced specialised units for the Atomic Energy Establishment.

From all Quarters

Lithium Concentrates

CANADA's first producer of lithium concentrates, Quebec Lithium Corporation, is stated to have increased its milling capacity to 1,000 tons a day. Under a five-year contract with Lithium Corporation of America, the company provides for delivery of 165 tons per day of lithium oxide concentrates of $11 per unit of lithia. As a by-product, feldspar production will also be increased, some 400 tons of feldspar concentrate being produced per day. Plans are being considered for the production of lithium sulphate from excess concentrates not sent to the US.

Canadian Nickel Plant

PRELIMINARY CONSTRUCTION has begun by International Nickel on its new $12½ million concentrating plant to be set up adjacent to the company's Levack mine near Sudbury, Ontario. The plant is scheduled to go into production this year. It will have a rated capacity of 6,000 tons daily and will produce both nickel sulphide and copper sulphide concentrates. The nickel concentrate will be treated at International Nickel's smelter at Coniston, Ontario, and the copper will be processed at the company's Copper Cliff reduction plant.

S. African Uranium

ACCORDING to a preliminary estimate of the South African Excise and Customs Department, the value of South African exports of prescribed materials (uranium and thorium) under the Atomic Energy Act in October was £3,020,144. In October 1955, uranium and thorium exports were valued at £4,253,087. The total for the first 10 months of 1956 was £30,845,170 compared with £24,295,724 in the corresponding period of 1955.

Australian Petroleum

GAS for domestic supply to Sydney is now being produced by Petroleum and Chemical Corp. (Australia) Ltd., Silverwater, New South Wales, as a by-product of oil processing. It is understood that the plant incorporates the first Semet-Solvay high BThU oil-gas plant outside North America.

Using a residual oil as starting material, the plant produces benzene, toluene and xylene, and light and heavy tar. The oil-cracking plant produces gas of high calorific value, with a high percentage of ethylene and propylene, which serves as a starting point for the production of various petrochemicals.

From Silverwater the gas by-product is fed through a main to the plant of the Australian Gas Light Co. where it is handled by fine tolerance blending and control equipment. Installations include the first Didier-Kegag final tar dehydration unit outside Europe, and tower-type purifiers which are also the first of their kind in the local gas industry.

India's Nuclear Power

INDIA's first nuclear power station is most likely to be set up before the end of the second five-year plan, in 1960-61, according to Dr. Homi J. Bhabha, Secretary of India's Atomic Energy Department. Generation of electricity will be the first use made of atomic energy. A number of uranium processing plants will be set up in India, the first within the next 18 months. The plant will be designed and built by India's Atomic Energy Establishment engineers.

Formosan Yeast Plant

TAIWAN Sugar Corp. has completed at Hsinying, Formosa, what is claimed to be the world's largest yeast plant. It has a capacity of 40 metric tons of pure yeast powder a day and cost NT $20 million and US $800,000 from US aid funds.

Fertiliser Use in Italy

THE AMOUNT of nitrate fertilisers used in Italy in July this year rose to 547,000 quintals, or 4.1 per cent more than the corresponding period in 1955. During the same period 457,000 quintals of phosphate fertiliser were consumed, an increase of 8.6 per cent over the 1955 figures.

Brazilian Developments

A NEW REFINERY is to be installed in the Federal District by Retrobras, It is to have a capacity of 90,000 barrels daily. The new refinery in Manans began functioning at the beginning of October with an initial production of 5,000 barrels daily.

According to a recent press report a manganese deposit has been discovered in the neighbourhood of Jundiai, in the State of Sao Paulo. The size of the deposit is not yet known.

Argentine Atomic Energy

A US CONCERN is to supply the Argentine Atomic Energy Commission with an experimental nuclear reactor. This reactor, which is to employ Argentine materials as far as possible, would be used to produce radioisotopes to replace those now being imported from the UK at a cost of over US $50,000 a year.

German Reactor

THE North Rhine Westphalian Parliament has unanimously asked the State Government to order from the UK a DIDO reactor for an atomic research institute to be set up near Dusseldorf.

Canadian Exodus

OF some 58,224 Canadian-born immigrants admitted to the US between 1 July 1950 and 30 June 1955, 24.3 per cent were classed as professional etc. A more detailed breakdown shows that one out of 20 Canadian chemists left for the US, as well as one out of 12 of all professional engineers, and one out of 15 of technicians.

Venezuelan Uranium

SEVERAL SAMPLES of uranium-bearing ore found in Tachira State, Venezuela, and sent for analysis to the US Atomic Energy Commission contain 70 to 120 grammes of uranium per ton of ore. Exportation of radioactive materials in Venezuela is reserved to the State, although foreign technical and financial aid are not excluded.

by
Peter Cooper F.P.S.

Toxic Hazards in Industry

Part V—DANGEROUS CHEMICALS IN USE

CAUSTIC ALKALIS and strong mineral acids constitute a well-recognised hazard, which, however, is minimised by the careful design of plant and the provision of remedial measures immediately available at the site of an accident. These substances destroy tissues rapidly, and the only first-aid measure practicable in emergency is immediate washing of the affected area with running water. The provision of hand-operated showers wherever acids or alkalis are piped or handled in large quantities should be routine.

Sulphuric acid presents a special problem, since its dilution produces considerable heat. Small splashes are best wiped off rapidly with cotton waste before washing, but where large areas are involved there will be no time to do this, and some degree of burning is bound to accompany washing. Afterwards, general treatment for shock will become necessary. The contamination of clothing with acid or alkali, or corrosive salts such as zinc or calcium chlorides is particularly dangerous, since the danger may be overlooked for a time. All soaked clothing should be removed, whether or not a shower has already been applied.

Phenol and Cresol Burns

Phenol and cresol are capable of inflicting severe burns. Phenol applied to the skin acts also as a powerful vasoconstrictor, and by interfering with the local blood supply may cause tissue gangrene. In addition, it is readily absorbed percutaneously, so that systemic reactions may be expected, particularly when clothing has been contaminated. Phenol burns are extremely painful, but the area soon becomes anaesthetic; necrosis of the skin usually occurs, and secondary infection is likely unless proper precautions are taken. The general reactions include headache, dizziness, twitchings and coma. The body temperature at first rises, but afterwards falls below normal. If phenol is splashed on the skin, any affected clothing should first be removed, then the area washed with water or dilute sodium bicarbonate solution, followed by alcoholic washing. The application of alcohol in the first stages provokes the further absorption of the chemical.

Hydrofluoric acid, by virtue of its reactivity, is liable to penetrate containers and faulty sealing compounds. It is insidious when spilled on the skin, since no immediate injury follows. After an hour or more, however, pain is felt, and the area blanches and blisters. Later the tissues, including bone, may be destroyed and converted into an indolent ulcer; bone usually reforms by a pathological process, causing characteristic deformations. The general effects of absorption may be met some days after the accident, and may lead to collapse and sudden death with few prior serious symptoms.

Hydrofluoric splashes should be washed at once with running water, then soaked with warm saturated sodium bicarbonate solution for ten minutes, after which a paste of magnesium oxide (20 per cent) in glycerine should be applied and covered with a dry dressing. Since the tissue destruction at the base of the area is not arrested by this treatment, calcium gluconate (10 per cent) injection should be infiltrated round the wound to seal it off from further action. These two preparations should be kept in readiness wherever hydrofluoric acid is handled, even in laboratory quantities.

HF gas by inhalation may produce vomiting and fatal collapse; in lower concentrations it is extremely irritating to the conjunctiva and the mucous membranes of the mouth, nose, throat and lungs. It may destroy the sense of smell, and may thus remain undetected for a long time. HF is usually detected in the atmosphere by its effect on test papers impregnated with zirconium p-dimethylaminoazobenzene arsonate, which turn from brown to red.

Cyanides are widely used in industry, and are liable to cause fatalities in the unwary. Gaseous HCN, used as a fumigant, tends to cling to fabrics and structures, and adequate ventilation is essential before persons are allowed into treated areas. The earliest sign of poisoning is headache; high concentrations of HCN are rapidly fatal, and few symptoms intervene. HCN and the cyanides are absorbed through the unbroken skin, as well as via the lungs as dusts and vapours. In the body they are metabolised and excreted largely as thiocyanates, which appear in the urine and blood of poisoned persons.

Procedure for Antidosis

The procedure for antidosis of cyanide poisoning depends upon the acceleration of this metabolic detoxication. When poisoning is suspected, all unnecessary muscular movements must be avoided, otherwise collapse and death will be accelerated. Unconscious victims must be given artificial respiration and ample oxygen. A crushable capsule of amyl nitrite may be broken under the nose or in the mask, and the drug inhaled for 15 to 30 seconds. As soon as possible (within minutes of the accident), 300 mg. of sodium nitrite in 10 ml. water should be injected intravenously, followed closely by 25 grammes of sodium thiosulphate in 50 per cent solution. Each injection is given slowly, at 2.5 to 5 ml. per minute, and if signs of collapse again supervene, the injections may be repeated once, or even a third time after an interval of two hours. Gastric lavage is useful only if the poison has been ingested by swallowing spray or licking contaminated fingers.

HCN is rapidly metabolised and eliminated, so that

Toxic Hazards in Industry

recovery or death is to be expected within a comparatively short time of poisoning. Hydrogen cyanide in working atmospheres may be estimated (non-specifically) by using test-papers of benzidine acetate and copper acetate, with which it produces a blue colour. The interference of chlorine, bromine and hydrochloric acid is overcome by using a congo red paper in series with the test-paper.

Chemical splashes in the eye are always serious, since the natural resistance to infection is thereby impaired for some time, and bacterial invasion is to be feared. The only effective first-aid is copious washing with running water; any attempt at neutralising the irritant wastes valuable time and may rob the victim of sight. Lime and cement-burns involve the embedding of solid particles in the conjunctiva and cornea. Such particles are not easily washed out, and need chemical solution. A solution of neutral ammonium tartrate has been extensively used in the past, but a better solvent is disodium ethylenediamine tetraacetate; it may be used as an irrigation in 0.5 per cent solution, made isotonic with sodium chloride, or in somewhat greater concentration if necessary. Large particles may have to be removed from the tissue mechanically. Since there is a severe spasm of the eyelids in lime-burns of the eye, cocaine eyedrops are usually necessary before treatment is instituted. After any chemical splashes in the eye have been irrigated with water, an emollient sterile ointment should be applied, and the organ protected from airborne infection by a sterile gauze pad. Even after minor casualties of this nature medical advice should be sought.

REFERENCES

Chen, Rose & Clowes, *Amer. J. med. Sci.*, 1934, **188**, 767.
Potter, *Brit. J. industr. Med.*, 1950, **7**, 125.
Jones, *J. industr. Hyg.*, 1939, **21**, 205.
Bennett & James, *Ann. int. Med. phys.*, 1950, **32**, 324.

Nitrogen Generators

RECENTLY PRODUCED Publication No. 65 by W. C. Holmes & Co. Ltd., of Turnbridge, Huddersfield, is devoted to Holmes-Kemp nitrogen generators. These machines produce nitrogen by the accurately controlled combustion of gaseous fuels followed by elimination of the water vapour and carbon dioxide produced. The brochure is illustrated and contains a useful flow diagram. Design features are given in detail and ancillary plant available for further processing of the nitrogen generated is described.

Citric Acid Manufacture

A SERIES of five advertisements, currently appearing for John & E. Sturge Ltd., Wheeleys Road, Birmingham 15, has been reprinted as a folder *Fine Citric Acid in the Making*. The advertisements which explain briefly, and in a light-hearted way, the production of Sturge citric acid have caused such favourable comment that the company has reprinted them in a more permanent form. Copies are obtainable on application.

MOISTURE DETERMINATION

Survey by BSIRA

KNOWN METHODS of determining the moisture content of solid materials are surveyed in a British Scientific Instrument Research Association publication by P. J. Geary, B.Sc., entitled *Determination of Moisture in Solids*. Moisture content of a great many solids is, of course, required for numerous purposes, mainly concerned with their production, sale, use or storage. Examples where moisture content is required are, chemicals, solid fuels, biological substances, textiles, crops, foodstuffs, paper and board, wood, ceramics, plastics, building materials, electrical insulating materials, soil in civil engineering and agriculture.

Information on possible ways of determining the amount of moisture in such materials is contained in this handbook. Lists of instruments and other apparatus for making measurements of moisture content which can be obtained in Great Britain are also given and there is an index to authors of texts listed as references (which number 227) as well as an index to manufacturers and agents and named apparatus.

This publication is obtainable from the publishers, British Scientific Instrument Research Association, 'Sina', South Hill, Chislehurst, Kent, at the following charges: Price in Great Britain (cash with order), 7s 6d post free; price to overseas purchasers (cash with order), 9s 6d post free. If cash does not accompany the order a surcharge of 1s will be made.

New Atomic Theory

A CONTROVERSIAL new atomic theory has been advanced by Robert L. Carroll of the US Naval Air Test Centre at Patuxent River, who theorises that, if an atom becomes cold enough, the electrons will gravitate to the nucleus and disintegrate it, releasing the entire energy of the nucleus. However, the key to the whole concept is a way to produce the extreme low temperature (below – 459.7°F) required for the reaction. Carroll, it is stated, has filed a patent on an electronic heat pump used to reach extremely low temperatures.

It is reported that the US Air Force is interested in the theory and is to reproduce the calculations.

Use of Genitron

INSTRUCTIONS on the use of Genitron N, developed for the low temperature expansion of epoxy resins, are contained in a brochure published by Whiffen & Sons, North West House, Marylebone Road, London NW1. Expanded epoxy resins are used for potting electrical components. In the past the temperatures required to expand the resin have been so high that damage to the component has often resulted. By the use of Genitron N it is claimed that resins can be expanded at temperatures of about 60°C. Various formulations are suggested in this brochure, depending on the nature of the final product required. During the course of work on Genitron N, Whiffen & Sons developed a special curing agent, Hardener HD, which is recommended for those applications where only the minimum exotherm can be tolerated.

Chemist's Bookshelf

LABORATORY ADMINISTRATION. *By* E. S. HISCOCKS. Macmillan, London. *1956.* Pp. xvi+392. *36s.*

One of the most important developments of the past 20 years has been the growth in the scope of scientific research and of research laboratories, both in number and size. To meet the needs of such growth without waste either of money or scientific manpower requires a high degree of organisation and administration. The author, who has been a research scientist, adviser to administrators and himself an administrator in a large scientific establishment, is well qualified to write on a subject about which little has previously been written in this country. Much of the book is concerned with Government scientific establishments and with the organisation and administration of these.

Following a first introductory chapter outlining the scope of the book and the problems discussed, the functions and duties of the head of a scientific establishment are considered. The variation of these with the size of the establishment, delegation of duties, channels of information and the selection of directors of research are among the topics discussed. The functions of staff and the staffing of scientific establishments are then outlined. Details are given of the Scientific Civil Service classes and of the staffing of comparable British, American and Canadian establishments. Qualifications of staff are discussed and distinctions drawn between scientists and technicians. The functions of special staff such as personnel and finance officers are also considered.

Staff Organisation

Two fairly long chapters are concerned with recruitment of staff, salaries, assessment of staff, promotion, transfers and the problem of the older man. Other topics discussed include staff organisations and welfare, the provision of results to other scientists or technologists and to the layman and such financial problems as budgeting for research, control of expenditure and costing. The planning of research and its evaluation are also considered.

Three chapters are concerned with services, laboratory buildings and maintenance. These are more general and provide a good deal of useful information regarding general services, more specialised ones such as photography and glass working and such factors in laboratory planning as choice of site, standardisation of furniture and fittings, space requirements and general maintenance. Two final chapters are concerned with patents, copyright and trade marks and with training for management, the latter giving details of recent developments in this country and the US.

Following these there is a note on the NPL test house and 22 appendixes which include salary surveys by professional bodies, civil service rates of pay and a salary scheme used by Imperial Chemical Industries and notes on terms of engagement of chemists. Details of annual confidential reports on the staff of DSIR, the American National Bureau of Standards and the Canadian National Research Council are also given and the appendixes include notes on organisation of Government research establishments and some useful details of safety precautions for laboratories in which radioactive materials are used. There is a useful bibliography and an adequate index.

The book is mainly concerned with larger establishments employing more than about 200 people and its scope is inevitably limited by the fact that so much refers to Government establishments and little to Research Associations or industrial establishments. It is perhaps doubtful whether, as the author says, the differences between large government institutions and small industrial organisations are on the whole functions of the relative sizes of the establishments. There are, however, many problems common to both and the author has accumulated a great deal of information and data which will be of considerable interest and value to all concerned in the organisation and administration of laboratories.

W. R. MOORE

Sewage Purification

SPECIALISTS in the design, manufacture and installation of mechanical equipment for sewage purification works, Ames Crosta Mills & Co. Ltd., of Heywood, Lancs, have published a booklet describing their range of Simplex circular settling tanks. The requirements for efficient sedimentation are: Efficient inlet arrangements to dissipate the kinetic energy of the incoming liquid and ensure even distribution; adequate retention period for the particular settlement duty, coupled with correct tank proportions to give controlled low velocities; adequate length of outlet weir; efficient sludge removal gear designed for the particular nature of the settled sludge.

Intermediates

A NEW LIST of specifications for intermediates for dyestuffs, pharmaceutical products, pigments and lakes, other intermediates and finished products and some technical grade insecticides has been issued by Hickson & Welch Ltd., Castleford, Yorkshire, for the third time in six years.

The company's products are set out in alphabetical order in two sections—Intermediates and Finished Products. The latter include Photine optical whitening agents and sulphur blacks. Also included in this publication is a chart of the stability of diazo compounds and their coupling speeds.

Chemical Industry Outlines

THE SADLER GROUP AT MIDDLESBROUGH

Right: Sir Samuel Sadler, Founder of the Company

A CENTURY AGO Middlesbrough was almost entirely an agricultural area. Changes however, were on the way and within a few years industry began to flock to the area. Among the new companies was a firm of chemical manufacturers founded in 1869 by Col. S. A. (later Sir Samuel) Sadler.

A native of Staffordshire, Sir Samuel was educated at London University, studying under Professor Mattieu Williams, Dr. Percy and Michael Faraday. He obtained his practical experience at the works of Chance of Oldbury.

After six years with Chance he founded his own works at Middlesbrough, becoming also the proprietor of branch works at Portsmouth, Ulverston, Stockton and Carlton.

In 1883 the companies were amalgamated as a limited liability company.

The first concern of the works was mainly tar distillation by-products such as alizarine, aniline and naphthol colours. Oxalic acid, dichromates, ammonia, potash, soda, sulphuric acid, bleaching powder and superphosphates were also manufactured in considerable quantity.

Successor as chairman of Sadler & Co. was Sir Samuel's son, Mr. C. J. Sadler, and it was during his term of office that considerable changes took place in the organisation of the company. The branches at Portsmouth and Stockton had already been disposed of. It was decided to do the same with those at Ulverston and others, which had been acquired later, at Spennymoor, thus centralising the firm's activities at Middlesbrough.

It was, however, thought necessary to purchase a coke oven plant to augment the supply of crude tar. In 1933 a plant belonging to Randolph Colliery Co. in County Durham was bought. This plant is now the only one operated by Sadler & Co. outside Middlesbrough.

On his death in 1936 Mr. C. J. Sadler was succeeded by his half-brother, Mr. Stanley Sadler, who had previously been managing director. The present chairman and managing director is Mr. C. N. Sadler.

In 1955 the company was divided into five registered companies operating under the parent organisation. They are: Sadler & Co. (Chemicals) Ltd., Sadler & Co. (Storage) Ltd., Sadler & Co. (Coke Ovens) Ltd., North-Eastern Tar Distillers (Sadlers) Ltd. and Tees-side Chemical & Engineering Merchants Ltd.

Sadler & Co. (Chemicals) is concerned with the production of commercial sulphuric and hydrochloric acids, pure sulphuric, hydrochloric and nitric acids, ammonia, battery acids and distilled water.

A large storage installation into which coal tar oils and other similar products are received in quantity and shipped to all parts of the world is operated by Sadler & Co. (Storage).

Sadler & Co. (Coke Ovens) was formerly the Randolph coke oven plant. When the plant was taken over it included 60 Koppers waste heat ovens together with a by-products plant for the recovery of ammonia and crude benzole. In 1948 the 60 ovens were replaced by 15 Woodhall-Duckham underjet compound ovens.

Naphthalene products are the main concern of North-Eastern Tar Distillers, together with anthracene, motor benzole, pure benzole, toluole and xylole. Coal tar acids of all grades, and disinfectant powders and liquids are also manufactured.

Sundry products such as creosote wood preservative and paints for decorative and industrial purposes are handled by Tees-side Chemical & Engineering Merchants.

Aerial view of Sadler's Middlesbrough Works

Cobalt Information

A CENTRE which will collect and disseminate information about cobalt and cobalt-containing alloys has been established at the Battelle Institute, Columbus, Ohio, US, under the direction of Dr. F. Rolf Worral.

Demand for cobalt is expected to increase as the properties of high-purity cobalt and its effects on alloys and steels are determined. At the present time cobalt is widely used in glass and enamel manufactures, in the chemical industries and in medicine. It is used as an alloying element for special magnets, and in telephones, radio, television, radar and other electronic equipment.

SYNTHESIS GAS FROM LIGNITE

Report on US Experiment Station's Progress

FACTS that would be useful in estimating the cost of a commercial plant for manufacturing synthesis gas from North Dakota lignite are presented in a Bureau of Mines technical report released last month by the US Department of the Interior.

Synthesis gas, a mixture of hydrogen and carbon monoxide, can be processed and purified for manufacturing ammonia, alcohols, commercial hydrogen, and synthetic liquid fuels, or it can be used directly as a reducing agent in various chemical and metallurgical processes.

The report is based on several years' testing on an externally heated, annular retort type gasifier at the Bureau's Lignite Experiment Station, Grand Forks, N. Dak. During nearly 9,000 hours of operation the unit processed nearly 2,000 tons of lignite and produced more than 84 million cu. ft. of synthesis gas. Natural lignite was used in some tests and steam-dried lignite in others.

O. C. Ongstad and W. H. Oppelt, chemical engineers at the Bureau's Grand Forks station, and M. H. Chetrick, a chemical engineer formerly with the Bureau there, wrote the report. Concluding that the experimental gasifier tested was near the practicable size limit, they assume that a commercial plant would group gasifiers of this type in batteries of 10. The authors made their estimates on the basis of a commercial plant with a capacity of 50 million cu. ft. of synthesis gas a day. On this basis, and assuming September 1954 price levels and pay scales, they developed construction and operating costs for two hypothetical plants, one designed for natural and the other for steam-dried lignite.

The cost of producing cooled, tar- and dust-free synthesis gas was estimated at 37.6 cents per thousand cu. ft. for the plant using natural lignite and 32 cents for that using steam-dried lignite. These figures do not include purification of the gas or return on capital investment.

A copy of the report, RI 5272, *Cost Data for Gasification of Lignite in an Externally Heated Retort*, can be obtained from the Bureau of Mines, Publications-Distribution Section, 4800 Forbes Street, Pittsburgh 13, Pa.

NUCLEAR RESEARCH PATENTS

AT ITS SIXTH SESSION held at Geneva in December the Council of the European Organisation for Nuclear Research (CERN) decided that as a general rule no patent protection will be sought for any inventions produced in its laboratories. The reasons given for this decision are that in view of CERN's character as an international body set up for pure research purposes, an active patent policy with its consequent trouble and expense, accompanied by the possibility of disturbance in morale and a distortion of the research programme, would not be indicated, and that it is preferable to provide merely for the simple publication of any inventions produced. Inventions produced in CERN laboratories will be published to the world, thus making them freely available to science and industry everywhere.

However, in exceptional cases of major economic importance, the Council has authorised the director-general to take such measures, including patent action as may seem appropriate.

Since CERN's two accelerators, the synchro-cyclotrons, will be in operation by the second half of this year, the scientific research programme has become more urgent. Estimated expenditure for this year is 61.8 million Swiss francs, compared with 39.6 million Swiss francs for 1956. For the long-term capital investment programme, i.e., that for the actual construction period from 1952 to 1960, 219 million Swiss francs have been approved by the Council. Construction costs are estimated at 166 million Swiss francs and 53 million for operating expenses covering research, theory, experimentation and maintenance.

Presentation to Dr. Parker

A presentation was made to Dr. Albert Parker (whose retirement from the directorship of Fuel Research, DSIR, was reported in THE CHEMICAL AGE of 22 December) on 20 December at the Fuel Research Station, London SE10. He received from the staff the gift of a portable typewriter.

New Appointments

ON 1 JANUARY Mr. Maldwyn Jones was appointed development director and Mr. H. C. Raine, research director of Imperial Chemical Industries' Plastics Division. On the same date Dr. Laurence M. Smith was appointed regional sales manager, plastics department, northern region sales.

Safety with Sulphuric

Methods for Unloading Tank Cars Explained

INSTRUCTIONS for the safe unloading and handling of sulphuric acid are presented on a new 17 in. by 22 in. wall chart available from the industrial chemicals division of Olin Mathieson Chemical Corporation, Baltimore 3, Maryland. The chart is printed in red and black on moisture-resistant paper.

It describes the proper methods for pump unloading and air unloading of tank cars, with special attention to cold weather procedure. Diagrams of piping arrangements are shown for both methods, as well as a list of safety 'do's' and 'don't's.'

The chart also includes instructions for preparation of tank cars for the return trip to the manufacturer.

Cass College Courses

THE following courses will be held at the Sir John Cass College, Jewry Street, Aldgate, London EC3, during the second term of the 1956-57 session. A course of eight lectures on brewing will be given by W. C. Lasman and J. G. Wreay on Tuesdays at 5.30 p.m., beginning on 22 January. A course of eight lectures on the principles and practice of distillation will be given by G. A. Dummett on Friday evenings at 6 p.m., beginning on 18 January.

'Patents and Industrial Design Protection' is the title of a course of eight lectures to be given by A. Walton on Thursdays at 6 p.m., beginning on 17 January.

Two courses in practical spectroscopy will be given by L. O. Freeman and D. B. Powell on Friday evenings, one in the second term and one in the third term. A course on emission spectroscopy, lasting 10 weeks, will be held from Friday 18 January to 22 March, from 6 to 9 p.m. A course on absorption spectroscopy, lasting 10 weeks, will be held from Friday 3 May to 5 July, from 6 to 9 p.m.

Enrolment forms and full particulars are obtainable from the secretary of the college.

ICI Loan Stock

IMPERIAL Chemical Industries Ltd. announces that its issue of £40 million 5½ per cent convertible unsecured loan stock has been subscribed almost six times by nearly 70,000 separate applicants. Allotment letters were due to be issued on 10 January, when particulars of allotments were also announced. The list for this offer closed on 2 January.

Commercial Intelligence

The following are taken from the printed reports, but we cannot be responsible for errors that may occur.

Mortgages & Charges

The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described herein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every company shall, in making its Annual Summary, specify the total amount of debt due from the company in respect of all Mortgages or Charges. The following Mortgages or Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.

PREMIER OIL & CAKE MILLS LTD. (formerly Premier Oil Extracting Mills Ltd.), Hull. 3 December, Trust Deed dated 13 November 1956, securing £500,000 debenture stock together with a premium of one per cent payable in certain events, issued by United Premier Oil & Cake Co. Ltd.; general charge (ranking pari passu with a debenture dated 13 November 1956); also 3 December, debenture (dated 13 November 1956), securing to Branch Nominees Ltd. all moneys due or to become due to the National Provincial Bank Ltd. from United Premier Oil & Cake Co. Ltd. but not ex. £200,000; general charge (ranking pari passu with a deed dated 13 November 1956). *Nil. 13 August 1956.

SOWERBY & CO. LTD., Grimsby, cake and oil manufacturers etc. 3 December, Trust Deed dated 13 November 1956, securing £500,000 debenture stock together with a premium of one per cent payable in certain events issued by United Premier Oil & Cake Co. Ltd.; general charge (ranking pari passu with a debenture dated 13 November 1956); also 3 December, debenture (dated 13 November 1956), securing to Branch Nominees Ltd. all moneys due or to become due to National Provincial Bank Ltd. from United Premier Oil & Cake Co. Ltd., but not ex. £200,000; general charge (ranking pari passu with a deed dated 13 November 1956). *Nil. 13 August 1956.

UNITED PREMIER OIL & CAKE CO. LTD., London EC. 3 December, £500,000 debenture stock together with a premium of one per cent payable in certain events secured by a Trust Deed dated 13 November 1956; general charge (ranking pari passu with a debenture dated 13 November 1956); also 3 December, debenture (dated 13 November 1956), securing to Branch Nominees Ltd. all moneys due or to become due to the National Provincial Bank Ltd. but not ex. £200,000; general charge (ranking pari passu with a deed dated 13 November 1956). *Nil. 23 May 1956.

UNIVERSAL OIL CO. LTD., Hull. 3 December, Trust Deed dated 13 November 1956, securing £500,000 debenture stock together with a premium of one per cent payable in certain events issued by United Premier Oil & Cake Co. Ltd.; general charge charge (ranking pari passu with a dated 13 November 1956); also 3 December, debenture (dated 13 November 1956), securing to Branch Nominees Ltd. all moneys due or to become due to National Provincial Bank Ltd. from United Premier Oil & Cake Co. Ltd. but not ex. £200,000; general charge (ranking pari passu with a deed dated 13 November 1956). *Nil. 13 August 1956.

Receivership

JEFFERIES CHEMICAL CO. LTD. (474,426), 4 New Bridge Street, London EC4. Peter L. Davies, 9 Old Burlington Street, London W1, ceased to act as Receiver and Manager on 26 November 1956.

Satisfaction

UK PLASTICS LTD. (formerly Celluloid Printers Ltd.), Surbiton, Surrey. Satisfaction 6 December, of debenture registered 21 August 1940.

New Registrations

Alliance (Chemical Plant) Ltd.

Private company (576,102). Registered 21 December. Capital £8,000 in £1 shares. Objects: to carry on the business of plumbers and chemical plumbers, chemical plant engineers, welders and leadburners etc. The permanent directors are: John F. Stratton, 8 Sandiway, Knutsford, Ches., director of Alliance (Manchester) Ltd. etc.; and Thomas F. Oldham, 'Woodbank,' Clement Road, Marple Bridge, Stockport, director of Thomas Oldham Ltd. Secretary: John F. Stratton. Solicitors: T. A. Needham & Son, Manchester 2, Registered office: Third Avenue, Trafford Park, Manchester 17.

R. S. Taplin Ltd.

Private company. (576,304). Registered 28 December. Capital £1,000 in £1 shares. Objects: to carry on the business of retail or wholesale consulting, analytical, manufacturing, pharmaceutical and general chemists, etc. The directors are: Reginald S. Taplin and Mrs. Elizabeth M. Taplin, both of 8 Stompond Lane, Walton-on-Thames. Secretary: Reginald S. Taplin. Registered office: 133 Hersham Road, Walton-on-Thames, Surrey.

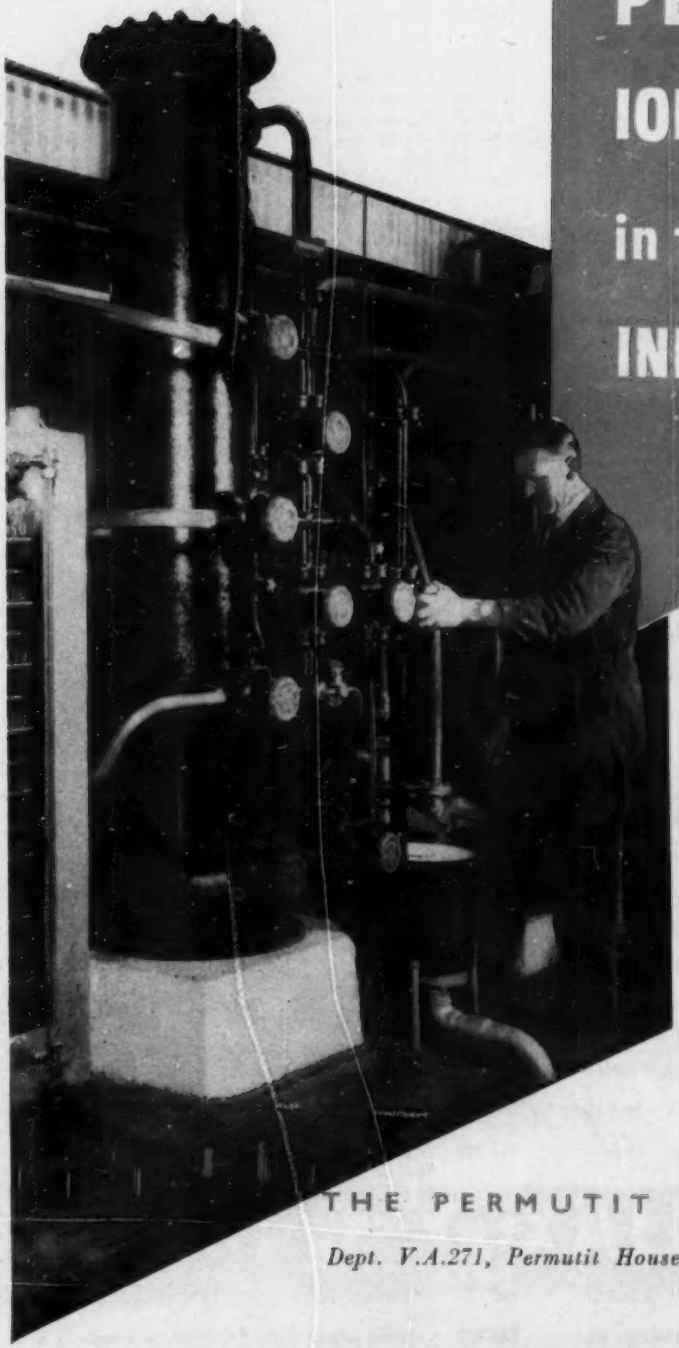
MARKET REPORTS

LONDON Rather more activity has been reported on the industrial chemicals market, with contract delivery specifications covering good quantities. Most sections of the soda products are moving well and there has been a steady demand for carbonate and caustic potash. Among other items for which there has been a good inquiry are borax, boric acid, hydrogen peroxide and the solvents. A steady overseas demand has been maintained. Creosote oil and cresylic acid are enjoying a good demand on home and export account, and interest in most of the other coal-tar products has been sustained. Pitch has received rather more inquiry.

MANCHESTER Trading conditions for heavy chemical products have on the whole, been back to normal after the seasonal dullness. Fresh inquiry on both home and shipping accounts has been on a fair scale and spread over a wide range of products. Reasonably good contract deliveries are being taken up by the textile and allied trades and other leading consumers. Prices are firm virtually throughout the range. There is a fair movement of fertiliser materials, and the tar products are moving steadily, especially pitch, creosote oil and most of the light distillates.

GLASGOW Owing to the New Year holidays, there is little of importance to report from the Scottish chemical market. Now the celebrations are over it is hoped for a quick return to normal business.

PERMUTIT ION EXCHANGE in the CHEMICAL INDUSTRY



Yet another application of Permutit Ion Exchange is the deacidification of formaldehyde, which is performed by the Permutit plant illustrated here. Increasing numbers of Permutit Ion Exchange plants are now being used to improve and accelerate many chemical and metallurgical operations. Perhaps in *your* industry Permutit can help to improve the product or reduce costs. For full technical information and advice, please write to :—

THE PERMUTIT COMPANY LIMITED

Dept. V.A.271, Permutit House, Gunnersbury Avenue, London, W.4
Telephone: CHIswick 6431

PATENTS

By permission of the Controller of HM Stationery Office the following extracts are reproduced from the 'Official Journal (Patents).' Copies of this publication may be obtained from the Patent Office (Sale Branch), 25 Southampton Buildings, Chancery Lane, London, WC2, price 2s 6d per copy (including postage); annual subscription £6 6s. The letter P or C preceding the number indicates that the application was accompanied by a provisional specification or a complete specification respectively.

APPLICATIONS

P34555 Steroids derivatives. Lovens Kemiske Fabrik.
C34552 Dioxazine series sulphur dyestuffs. Cassella Farbwerke Mainkur AG.
C34481 Diolefines &c. copolymerisation process. Chemische Werke Huls AG.
C34622 Butadiene production. Chemische Werke Huls AG.
C34650 Molybdenum-base alloys. Climax Molybdenum Co.
C34651 Molybdenum-titanium-cobalt alloy. Climax Molybdenum Co.
C34737 Liquefied gas storage body unloading apparatus. Constock Liquid Methane Corp.
P34629 Optically active amino acids. Courtaulds Ltd.
C34405 Cupric oxychloride suspension. Cupra Soc. des Produits Chimiques SA.
P34438 Chemical process. Distillers Co. Ltd.
C35003 Water clarifying method. Dow Chemical Co.
C34832 Polyvinyl chloride coating applying process. Droessaert, R.
C34642 Hydrocarbon conversion process. Esso Research & Engineering Co.
C34789 Low viscosity polymer oil. Esso Research & Engineering Co.
C34790 Radiochemical reactions. Esso Research & Engineering Co.
C34641 Benzene purification process. Esso Research & Engineering Co.
C34967 Oils drying preparation. Esso Research & Engineering Co.
C34787 Liquids filter. Etablissement G. Pepin Fils Aine et Soc. du Filtre Gasquet.
C34723 1-Phenyl-2,3-dimethyl-4-amino-5-pyrazolone phosphoric acid derivatives. Farbenfabriken Bayer AG.
C34825 Azine cyan colour formers. General Aniline & Film Corp.
C34866 Hydrocarbons hydrogen treatment. Gulf Research & Development Co.
C34912 Naphthalic acid &c. converting process. Henkel & Cie Ges.
P34649 Waste sulphuric acid recovery. Holmes, W. C., & Co. Ltd., Refiners Ltd.
P34710 Crust oil leather treatment process. Hopwood, G. S.
C34634 Ore reduction. Howard, J. J.
P34294 Dust removal. Imperial Chemical Industries Ltd.
P34503 Natural, etc., rubbers. Imperial Chemical Industries Ltd.
P34295 Synthetic materials dyeing etc. Imperial Chemical Industries Ltd.
P34504—P34505 Organic compounds oxidation. Imperial Chemical Industries Ltd.
P34830 Temperature control. Imperial Chemical Industries Ltd.
C34543 Therapeutic compounds. Irwin, Neisler & Co.
P34704 Engine oil acid neutraliser. Julian, K. B.
C34985 Aluminium. Kaiser Aluminium & Chemical Corp.
P34553 Antihaemophilic factor recovering method. Kekwick, R. A.
C34403 Alkali metal polyphosphates. Knapsack-Griesheim AG.
C34404 Processing phosphorus sludge. Knapsack-Griesheim AG.
P34977 Hydrogen peroxide. Laporte Chemicals Ltd.
P34502 Portable water-distillation apparatus. Lea Bridge Industries Ltd.
C34274 Corrosion inhibiting paint composition. Marx, W.
C34865 Aryl magnesium chloride complexes. Metal & Thermit Corp.
C34791 Liquids, etc., impregnation. Miller F. J.
C34285 Liquid phenolic condensation products. Monsanto Chemical Co.
C34862 Selective hydrogenation. Olin Mathieson Chemical Corp.
C34863 Steroids synthesis. Olin Mathieson Chemical Corp.
C34289 Fluorobutadienes. Pennsylvania Salt Manufacturing Co.
C34733 Condensates separating, etc., apparatus. Perfogit Soc. per Azioni.
C34788 Vitamin product preparation. Pfizer & Co. Inc.
P34414 Gas humidification, etc., processes. Pratt, H. R. C.
C34344 Phosphate coatings formation. Pyrene Co. Ltd.
C34992 Pigment dyestuffs. Sandoz Ltd.
C34993 Metallisable azo dyestuffs production process. Sandoz Ltd.
C35013 10-(Aminoalkyl)-trifluoro-methylphenothiazine derivatives. Smith Kline & French International Co.
C34383 Phenthiazine derivatives. Soc. des Usines Chimiques Rhone-Poulenc.
P34745 Immiscible liquids separating apparatus. South Eastern Gas Board.
C34368 Solid polymers, etc., producing process. Standard Oil Co.
P34796 Detergent compositions. Unilever Ltd.
C34913 Fumes treatment. Union Carbide & Carbon Corp.
C34393 Naphthalene, etc., fusion kettles. Union-Chemie.
C34342 Chemical compounds. Upjohn Co.
C34988 Steroids. Upjohn Co.
C34886 Magnesium metal producing method. Vereinigte Aluminium-Werke AG.
P34976 Bactericidal substances. Vitamins Ltd.
P34443 Chemical compounds. Whiffen & Sons Ltd.

ACCEPTANCES

Applications in the following list, and the specifications filed in pursuance thereof, will be open to public inspection in due course. Persons interested may give notice of opposition to the grant of a Patent on any of the applications included in the list by filing Patents Form number 12 *at any time within the prescribed period. See 'Official Journal (Patents)' for dates on which these applications will be open to public inspection.*

766 276 Benzene purification from mixed feed stocks. Esso Research & Engineering Co.
765 886 Antibiotic ristocetin. Abbott Laboratories.
765 888 Selective reduction of ketosteroids with yeast. Farmaceutic Italia SA.
766 280 Hydrogen from water gas or other crude gases. Veb Leuna-Werke W. Ulbright.
765 850 (Divided out of 765 849.) Quaternary ammonium salts. University of Leeds.
766 018 Diazo dyestuffs and complex heavy metal compounds. Geigy AG.
765 020 Yellow substantive diazo stilbene dyestuffs. Farbenfabriken Bayer AG.
766 281 Production of carbon black. Phillips Petroleum Co.
765 890 Microbiological production of vitamin B_{12}. Naamlooze Vennootschap Philips' Gloeilampenfabrieken.
766 282 Separating mixtures of monovinyl ethers of glycols and the glycols themselves. Deutsche Solvay-Werke Ges.
766 283 Synthetic filaments or fibres from dextron ether compositions. Commonwealth Engineering Co. of Ohio.
766 021 Hydrofining of crude oil fractions. Badische Anilin- & Soda-Fabrik AG.
765 977 Luminescent substances. Philips Electrical Industries Ltd.
765 893 Organic copolymers. Du Pont de Nemours & Co.
766 177 Production of dispersions. Boehme Fettchemie Ges.

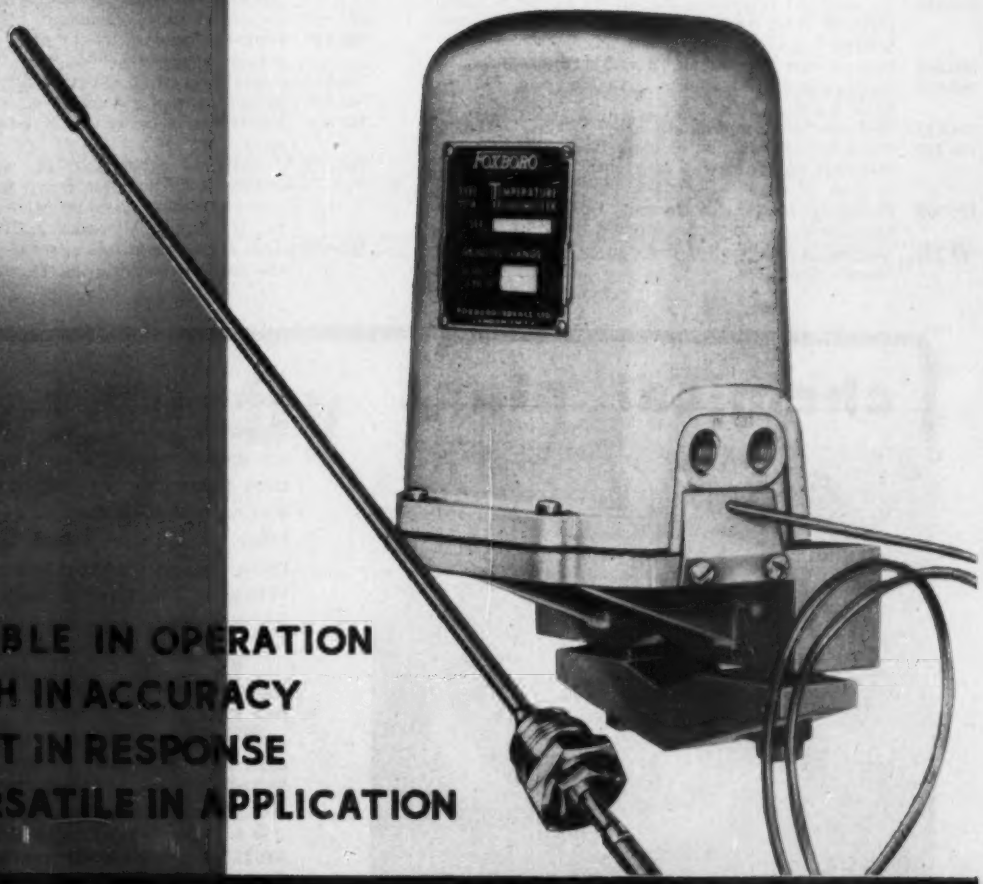
[turn to page 104

Better temperature measurement & transmission with the new

FOXBORO

M/12A Pneumatic

TEMPERATURE TRANSMITTER



- STABLE IN OPERATION
- HIGH IN ACCURACY
- FAST IN RESPONSE
- VERSATILE IN APPLICATION

FOXBORO-YOXALL LIMITED

LOMBARD ROAD MERTON LONDON S.W.19

PATENTS ACCEPTANCES

from page 102]

766 178 Betaine salts. Beaufour, H., Beaufour, A., Bwzas, A., and Dufour, C.
766 288 Filtering cartridge for liquids and gases. Gewiss, L. V.
765 945—765 946 Growing of primary ammonium phosphate crystals. Clevite Corp.
765 920 Morphinane derivatives. Hoffmann-La Roche & Co.
766 290 Ethylene terephthalic-ethylene isophthalic copolyesters. Goodyear Tire & Rubber Co.
765 897 Resin-impregnated porous bodies. Dow Chemical Co.
765 898 5-Nitro-2-furfural diacetate. Norwich Pharmacal Co.
766 293 Mono-carboxylic acid esters of cellulose. Celanese Corp. of America.
765 901 Fluorine compounds. International Minerals & Chemical Corp.
765 902 Substituted cyclohexylamines. Schering Corp.
766 148 Reinforced urea-amineformaldehyde compositions. Du Pont de Nemours & Co.
766 198 Coloured cellulose ethers and xanthates. Manufactures de Produits Chimiques du Nord Etablissements Kuhlmann.
765 947 Preparation of lubricating greases. Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij.
766 298 Dyeing linear aromatic polyester textile material. Badische Anilin- & Soda-Fabrik AG.
765 821 Tropine and nortropine derivatives having a quaternary N atom and process for their manufacture. Sandoz Ltd.
766 202 Interpolymer compounds. Kodak Ltd.
765 923 Anthraquinone dyestuffs. [Addition to 764 030] Sandoz Ltd.
766 215 Hydrocarbon compositions. Ethyl Corp.
766 220 Continuous production of tubes from glass and other materials liquefiable in heat. Jenear Glaswerk Schott & Gen.
765 903 Partial epoxidation of naturally occurring oils. Food Machinery & Chemical Corp.
766 222 Method and device for neutralising fatty oils. Aktiebolaget Separator.
765 989 1-Phenylalkylaminoethyl-4-substituted piperazines and salts. American Cyanamid Co.
765 832 Coking processes for converting heavy oils. Esso Research & Engineering Co.
766 225 Hydrocarbon drying oil production. Esso Research & Engineering Co.
766 226 Amine salt of penicillin and method of isolating penicillin. American Home Products Corp.
766 306 Treating silica-magnesia catalysts. Esso Research & Engineering Co.
766 095 Low temperature tar. Koppers Co. Inc.
766 245 Preparations containing erythromycin. Eli Lilly & Co.
766 000 Separation of suspended particulate matter from gases. Research Corp.
766 246 Phenyl-ethyl-acetyl methionine. Chimie et Atomistique.
766 027 Isomerisation of waxy hydrocarbons. Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij.
765 904 Treating thermoplastic polymeric films. Du Pont de Nemours & Co.
766 036 5-Benzyloxy-indole derivatives. Francesco Vismara Soc. Per Azioni.
765 962 Cellulose acetate tow. [Divided out of 769 961.] Eastman Kodak Co.
765 854 Substituted piperidines. [Divided out of 765 853.] Abbott Laboratories.
765 921 Manufacture of isoquinoline derivatives. [Divided out of 765 920.] Hoffmann-la Roche & Co.
765 804 Epoxides of Diels-Alder adducts. [Divided out of 760 302.] Velsicol Chemical Corp.
683 905 Organo-siloxanes. Diamond Alkali Co.
766 325 Penicillin salts of esters of 4-amino-salicylic acids. Rheinpreussen AG Fuer Bergbau Und Chemie.
766 534 Copolymers of acrylonitrile. Farbwerke Hoechst AG.
766 535 Manufacture of chromiferous azo-dyestuffs. Ciba Ltd.
766 536 Pantetheine-4' phosphate. National Research Development Corp.
766 432 Continuous production of aqueous solutions of sodium hydrosulphite from sodium amalgam and gaseous sulphur dioxide. Montecatini Soc. Generale Per L'Industria Mineraria E Chimica.
766 638 Salts of sulphuric acid esters of leuco vat dyestuffs of the anthraquinone series. Durand & Huguenin AG.

chemical plant

New Twin Shaft Portable Propeller Stirrer (Patent Applied for)

Kestner

Chemical Engineers

5 GROSVENOR GARDENS · LONDON · S.W.1

The Kestner organisation serves many industries. In fact, wherever chemicals are manufactured or used, it is more than likely that you will find some Kestner plant—it may be a stirrer or other small item—it may be a large spray drier or the entire process plant. Whatever it be, large or small, you will find it doing "a good job."

If you are needing any new plant Kestners can help you on any of the following subjects:—

ACID HANDLING. Pumps, Fans, Pipe Lines, etc. **ACID RECOVERY PLANT. DRYING PLANT.** All types. **EVAPORATION PLANT.** A complete range of plants to suit all evaporation problems. **FLUID HEAT TRANSMISSION SYSTEMS. GAS ABSORPTION AND REACTION SYSTEMS. ISOLETRIC SYSTEM FOR PROCESS HEATING. KEEBUSH** A constructional material resistant to the action of all corrosive liquids and gases. **LABORATORY AND PILOT PLANT. STIRRERS AND MIXING EQUIPMENT.**

THE
MANCHESTER COLLEGE
OF SCIENCE AND TECHNOLOGY

Principal : B. V. BOWDEN, M.A., Ph.D. (Cambridge), M.I.E.E.

DEGREE COURSES IN TECHNOLOGY

Departmental Prospectuses of University Courses give particulars of the courses leading to the Manchester University Degrees (B.Sc.Tech., M.Sc.Tech., and Ph.D.) and Post-Graduate Diplomas and Certificates in the Faculty of Technology, in the following Departments:—

MECHANICAL ENGINEERING, Professor H. WRIGHT BAKER, D.Sc., M.I.Mech.E.

ELECTRICAL ENGINEERING, Professor E. BRADSHAW, M.B.E., M.Sc.Tech., Ph.D., M.I.E.E.

MUNICIPAL ENGINEERING, Professor R. J. CORNISH, M.Sc., M.I.C.E., A.M.I.Mech.E., M.I.Struct.E., F.R.S.H.

CHEMISTRY, including Chemical Technology of Fermentation Processes (including Brewing), Industrial Biochemistry and Colouring Matters, Professor H. N. RYDON, D.Phil., Ph.D., D.Sc., M.Sc.Tech., A.R.C.S., D.I.C., F.R.I.C.

CHEMICAL ENGINEERING, including Fuel Technology and Metallurgy and Assaying, Professor F. MORTON, M.Sc.Tech., Ph.D., D.Sc., F.R.I.C., M.I.Chem.E.

TEXTILE CHEMISTRY (Bleaching, Dyeing, Printing and Finishing; Paper Technology), Professor R. H. PETERS, B.Sc., Ph.D.(London), F.R.D.C.

TEXTILE INDUSTRIES (General Textile Technology, and Textile Engineering), Professor W. E. MORTON, M.Sc.Tech., F.T.I.

BUILDING, W. B. MCKAY, M.Sc.Tech., M.I.Struct.E.

APPLIED PHYSICS, Professor H. S. LIPSON, M.A., D.Sc. F.Inst.P.

INDUSTRIAL ADMINISTRATION (Post-Graduate Diploma Course), Professor R. W. REVANS, B.Sc., Ph.D.

For further information apply to the Registrar,
THE MANCHESTER COLLEGE OF SCIENCE AND TECHNOLOGY
MANCHESTER, 1.

Getting by on LESS OIL

The right "know-how" often pulls out 10 per cent or more extra efficiency on oil-burning plant. Why not ask your fuel suppliers or N.I.F.E.S to help you meet the fuel-oil cut? Remember too, that even when oil-burning plant is at maximum efficiency 20 per cent or more fuel can often be saved by efficient process use and space heating arrangements. *Let N.I.F.E.S advise you.*

Issued by **N·I·F·E·S** *National Industrial Fuel Efficiency Service*
Head Office: **71 Grosvenor Street London W1** *Telephone:* Hyde Park 9706

Classified Advertisements

CLASSIFIED RATES: All sections 5d. per word. Minimum 8/-. Three or more insertions 4d. per word. Box Number 2/- extra. Up to mid-day Tuesday for insertion same week.

SEMI-DISPLAY: 30/- per inch. Three or more insertions 25/- per inch.

SUBSCRIPTION: Annual Subscription of 52/6 brings 52 weekly copies of THE CHEMICAL AGE direct to your address from the printer (postage paid by the publishers), and a copy of THE CHEMICAL AGE YEAR BOOK.

COMPANY MEETINGS AND REPORTS: £12.12.0 per column. Three column measure (approximately 360 words).

OFFICIAL APPOINTMENTS

DRAUGHTSMEN
are required by the
NORTH THAMES GAS BOARD
at its
TAR AND AMMONIA PRODUCTS WORKS
at
BECKTON, EAST HAM, E.6.

The posts offer possibilities of obtaining experience in the expanding field of Chemical Engineering for applicants who have had a sound mechanical training.

Starting salary will depend on age and experience.

The successful candidate will be required to join the Staff Pension Scheme.

Applications, giving age and full particulars, to
THE STAFF CONTROLLER,
NORTH THAMES GAS BOARD,
30, KENSINGTON CHURCH STREET, W.8,
quoting referecne 666/389.

GOVERNMENT OF UGANDA

Nutritional Chemist, Department of Veterinary Services,

QUALIFICATIONS—Honours Degree in Chemistry or A.R.I.C. Post-Graduate work in the nutritional field or in plant chemistry an advantage.

DUTIES—Investigation of the nutritional value of local foodstuffs and metabolism, studies of indigenous farm livestock.

TERMS OF APPOINTMENT—On permanent and pensionable or contract/gratuity terms with emoluments in the scale £939-£1,863 per annum. Outfit allowance. Free passages. Quarters provided at rental. Free medical attention. Generous leave. Income tax at local rates.

Apply to
DIRECTOR OF RECRUITMENT,
COLONIAL OFFICE, LONDON, S.W.1,
State age, qualifications and experience. Quote BCD.67/9/09.

SITUATIONS VACANT

EXPERIENCED CHEMIST required for laboratory of large mining group in Northern Rhodesia. Applicants, who should be between 28 and 32 years of age, must have a degree in chemistry or an equivalent qualification and have had 3 to 5 years previous experience, preferably on inorganic analyses. He should also have had experience in spectrography. He must be research minded and be prepared to undertake research into new methods of analyses. Starting salary from £1,044 p.a. plus cost of living allowance at present approximately £60 p.a. and variable bonus currently 60 per cent of basic salary. Free outward passage for employee. Leave at 48 days p.a. may be accumulated up to 144 days. Applicants should send full particulars, age, education, qualifications, experience and marital status to R.16, **BOX No. C.A. 3516, THE CHEMICAL AGE, 154, FLEET STREET, LONDON, E.C.4.**

SITUATIONS VACANT: continued

ASSISTANT BUYER—PFIZER LTD.

With the continued expansion of the Company a vacancy occurs for
ASSISTANT BUYER
and applications are invited from persons, preferably in the 25-35 age-group, who have had a sound general purchasing experience, and a knowledge of the sources of supply of Chemicals/Sundries and Chemical Engineering Plant and Equipment.

The appointment offers ample scope for initiative and advancement in the Company.

A salary commensurate with age and experience will be paid.

A generous non-contributory Pension and Life Assurance Scheme is in operation.

Applications, which will be treated in confidence, giving details as to age, education, experience, etc., should be sent to
PERSONNEL OFFICER,
PFIZER LTD.,
137-139, SANDGATE ROAD, FOLKESTONE,
quoting reference RS/AB/4157.

CHEMICAL ENGINEER required to design equipment for the chemical processes of the photographic industry. Initially, work will be on dye intermediates and couplers but will later include application of chemical engineering principles to the many types of process plant within the industry. Applicants should possess a Degree and/or A.M.I.Chem.E., with preferable three to four years' industrial experience. The position is permanent, progressive and pensionable on a non-contributory basis. Five-day week and three weeks' annual leave. Salary according to experience. Write **PERSONNEL DEPT., KODAK LTD. (FACTORIES), WEALDSTONE, MIDDX.**

CHEMIST. Young graduate or equivalent required by expanding company for polymer research. Progressive appointment. Staff Pension Scheme and life assurance. Applications in writing giving age, qualifications and experience to **VINYL PRODUCTS LIMITED (RL/J), BUTTER HILL, CARSHALTON, SURREY.**

WILMOT-BREEDEN LIMITED require **GRADUATE CHEMISTS** with experience of, or interest in, electro-deposition and/or organic chemistry, for work in their new Central Research Establishment at Umberslade Park, Warwickshire.

Working conditions are unusually attractive in pleasantly situated and well-equipped laboratories. There is a generous superannuation scheme.

Applicants should send full details of education and experience to the Chief Research Chemist, Umberslade Park, Hockley Heath, Warwickshire.

BOX NUMBERS: *Reply c/o "The Chemical Age" · Bouverie House · Fleet Street · EC4*

FOR SALE

FOR SALE.

Strong **SOFTWOOD CASKS**, tongued and grooved, approx. 40 gallon size, after dry chemicals, fully re-coopered for colours and all dry-goods. 12s. 6d. each. (Can be remade to other sizes.) **JAMES GREIG LIMITED, VIRGIL - STREET, LIVERPOOL, 5.**

MIXERS—1 Baker Hand-tilted Trough, 16 in. by 24 in. by 20 in Fast and loose pulleys and clutch. "Z" blades.
1 Ditto Power-tilted Trough, 30 in. by 20 in. by 24 in. Pulley drive and clutch. Four "L" blades.
THOMPSON & SON (MILLWALL), LTD.,
LONDON, E.14.
TEL.: EAST 1844

MORTON, SON AND WARD, LIMITED, STAINLESS STEEL VESSELS

VESSELS of all shapes and sizes, jacketed or unjacketed—with stainless steel mixing gear to requirements; also stainless steel storage tanks and vauum vessels.
"**MORWOOD**" "**U**"-**shaped TROUGH MIXERS**—up to 2 tons, in stainless steel, with agitators, scroll or paddle type, jacketed or unjacketed.
Stainless Steel **TROUGHS, TANKS** and **CYLINDERS** made to requirements.
These items can also be fabricated in mild steel.

JACKETED PANS

100g., 150g., and 200g., new, in mild steel, for 100 lb. p.s.i. w.p.—with or without mixing gear.
3 **cwt. TROUGH MIXERS** by **CHALMERS** and **GARDNER**—stainless steel-lined troughs.
50g., 75g. and 100g. heavy duty **MIXERS** by **FALLOWS** and **BATES**. Agitators driven through bevel gears from fast and loose pully.
200g. cast-iron **JACKETED MIXING VESSEL** with nickel-chrome impellor type agitator driven through bevel gears from fast and loose pulley.

AIR COMPRESSORS

THREE 30 c.f.m. at 100 lb. pressure, water cooled, automatic overloads, with or without motors.
AIR RECEIVERS MADE TO REQUIREMENTS. PUMPS
Selection of new MONO and second-hand Pumps in stock—2 in. to 5 in.

Inquiries Invited.

MORTON, SON AND WARD, LIMITED,
WALK MILL,
DOBCROSS, NEAR OLDHAM,
Lancs.
Phone Saddleworth 437

PHONE 98 STAINES

STAINLESS STEEL PLANT

S.S. "GARDNER" SIFTER/MIXER—40 in. by 17 in. by 17 in.
S.S. AUTOCLAVES—6 ft. by 3 ft., 100 w.p (Three.).
S.S. 100-gal. **JACKETED PAN AND MIXERS.**
S.S. TIPPING PANS—65 gallons (Two).
S.S. ENCLOSED ELEVATOR—40 ft. centres.
S.S. 30-gal. **GAS-HEATED PAN.**
S.S. 40-gal. **OPEN PAN.**
S.S. and Chrome **EMULSIFIER/MIXING ARMS**—A.C.
S.S. LARGE SINK UNITS—3 ft. by 2 ft. by 1 ft. 3 in. (Two.)
TANKS, PANS, PUMPS, CONDENSERS, CALORIFIERS, STILLS, HYDROS, REFINERS, all types of **MIXERS.**
Send for Lists.
HARRY H. GARDAM & CO., LTD.

500-gallon Aluminium Portable Tank—6 ft. 6 in. by 3 ft. 6 in. by 3 ft. 6 in. deep. 250-gallon Stainless Steel 4-compartment Tank. **WINKWORTH MACHINERY LTD., 65, HIGH STREET, STAINES.** Telephone 1010.

VOSS STIRRERS—Industrial (ask for new leaflet) Geared and Flameproof Units, Laboratory, Micro and Magnetic Stirrers, with or without hotplate. **VOSS INSTRUMENTS LTD., MALDON, ESSEX.**

FOR SALE: continued

STURTEVANT FINE GRINDING AND SELECTION PLANT, cap. 1-2 cwt. per hour 100 mesh med. hardness material comprising Fine Crusher No. 0, Ring Roll Mill No. 00, Fan, Air Separation, Conveyors, etc. Drawing available. **W. URQUHART, 1023, GARRATT LANE, S.W.17.**

WANTED

INDUSTRIAL BY-PRODUCTS, LTD., 16, Philpot Lane, London, E.C.3. will be pleased to receive particulars of any by-products, waste materials and residues for disposal.

WORK WANTED & OFFERED

CRUSHING, GRINDING, MIXING and DRYING for the trade.
THE CRACK PULVERISING MILLS LTD.
Plantation House
Mincing Lane,
London, E.C.2.

GRINDING, CRUSHING AND GRADING
FINE GRINDING LTD.,
BLACKHOLE MINE, EYAM
TELEPHONE: EYAM 227

PULVERISING of every description of chemical and other materials. Collections, storage, deliveries. **THOMAS HILL-JONES, LIMITED, INVICTA WORKS, BOW COMMON LANE, LONDON E.3. (TELEPHONE: EAST 3285).**

PATENTS

The Proprietor of British Patent No. 661470, entitled "**APPARATUS FOR EFFECTING SELF-REGULATED PARTIAL CONDENSATION OF CONDENSABLE VAPOURS,**" offers same for licence or otherwise to ensure practical working in Great Britain. Inquiries to Singer, Stern & Carlberg, 14 E. Jackson Boulevard, Chicago 4, Illinois, U.S.A.

AUCTIONEERS, VALUERS, Etc.

EDWARD RUSHTON, SON AND KENYON (Established 1855).

Auctioneers, Valuers and Fire Loss Assessors of
CHEMICAL WORKS PLANT AND MACHINERY
York House, 12 York Street, Manchester.

Telephone 1937 (2 lines) Central Manchester.

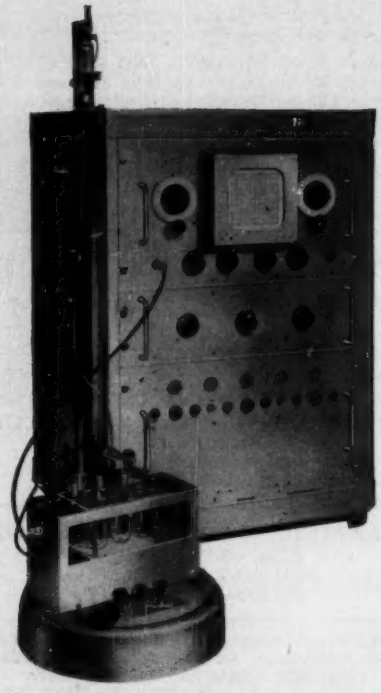
INVITATION TO TENDER

The Board of Trade has for disposal approximately 9,400 lb. **PYRETHRUM EXTRACT** of Kenya origin (Pyrethrin content 23.8-25.4 per cent) in 50 lb. and 100 lb. drums lying at the Board of Trade Depot, Oakley, Worminghall, near Aylesbury, Bucks.
Full particulars and forms of tender (returnable by 12th February 1957) may be obtained on application to **THE BOARD OF TRADE, C. & G. 7(B), ROOM 317, LACON HOUSE, THEOBALDS ROAD, LONDON, W.C.1.** (Telephone: Chancery 4411, Ext.: 329/330).

HEATING TAPES ★

For many applications

May we help you with your problem ?
THE STABILAG CO. LTD.
MARK ROAD · HEMEL HEMPSTEAD



progress in polarography

- ★ Speedy direct or derivative operation.
- ★ Direct reading from scale eliminates geometrical construction.
- ★ Greater resolution due to formation of Peaked Polarograms.
- ★ Polarograms reproduced every seven seconds.
- ★ Increased sensitivity enables accurate determinations at concentrations of fractions of a microgram per millilitre.

with the *cathode ray* polarograph

you have the ultimate in Polarographic technique, without undue complexity of control. Suitable for research or routine, it is supplied complete with its Electrode Stand which includes a thermostatically-controlled tank, provision for simultaneous de-gassing of the three cells and easy means of raising and lowering the electrode in the solutions under test. Oscilloscope cameras may be obtained as extras. We offer an applications advisory service together with demonstrations on your samples.

Brochure 105 sent on request

SOUTHERN INSTRUMENTS COMPUTER DIVISION,
PROPRIETOR: SOUTHERN INSTRUMENTS LTD.
CAMBERLEY, SURREY.
TEL: CAMBERLEY 2230 (3 lines)

s i n d a k
service to research and industry

QUARTZ

Tubes, Rods and Sheets
(transparent or translucent)
Hyperpure Quartz Equipments
for processing semi-conductors
Equipment and Apparatus
to customer's specification
Crucibles, Trays and Ignition Boats
(with highly polished inner surface)
Filter Crucibles
Water Bi-Distillation Stills
Infra-Red Driers and Heaters
Immersion Heaters
Infra-Red Surface Evaporators
Ozone-Free Quartz

FLEISCHMANN (LONDON) LIMITED
16 Northumberland Avenue
LONDON, W.C.2
Telephone: Whitehall 0573 (5 lines)
Telegrams: Newmet London
Teleprinter No. 8016

For all types of BOILERS

★

DURABILITY
EFFICIENCY

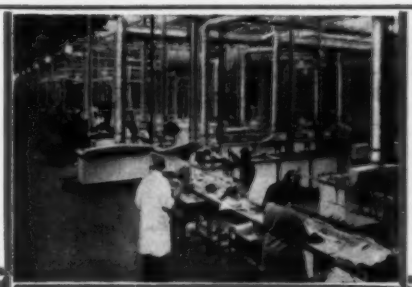
Patents
207123
490306
581396

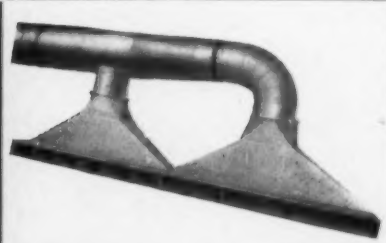
AIR SPACE DESIGNED TO SUIT DRAUGHT AND FUEL HEAT RESISTING METAL

COLLINS IMPROVED FIREBARS LTD.
51 · THE MALL · EALING · LONDON · W·5
Tel: EALING 4070

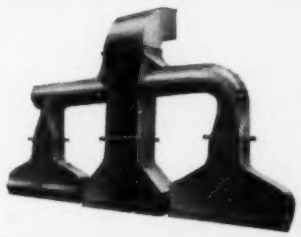
PRODORITE LTD

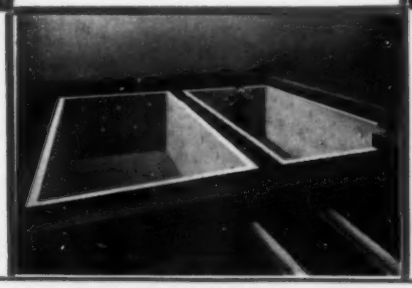
SPECIALISTS IN ALL TYPES OF ACID PROOFING





Acid - proof Tanks and Linings, Acid resisting Floor Surfaces, Neutralising Schemes, Corrosive Fume Extraction, Pipe Lines for Corrosive Fluids, Manufacturers of a complete range of Chemical Resisting Cements and Mastics





Why not consult us?

HEAD OFFICE
EAGLE WORKS
WEDNESBURY
TELEPHONE · WED 0284 5 LINES

LONDON OFFICE
ARTILLERY HOUSE · ARTILLERY ROW SW1
TELEPHONE · ABBEY 3816 5 LINES

ACID & ALKALI
RESISTING LININGS
IN
BRICK, TILE, P.V.C.
&
RUBBER
FOR ALL TRADES

COMPLETE PLANTS FOR PICKLING FUME EXTRACTION & EFFLUENT TREATMENT

PICKLING TANKS 90 FEET LONG WORKING SUCCESSFULLY

RIZISTAL

ALL BRITISH GUARANTEED PRODUCTS

RIZISTAL TRADE MARK

MANUFACTURERS OF SILICA, LATEX, CASHEW, FURANE, & POLYESTER RESIN CEMENTS

SKYMMIT & BRUSH-ON IMPERVIOUS COATINGS

P.V.C. & STAINLESS STEEL FABRICATIONS FOR ALL PURPOSES

JOHN L. LORD & SON
WELLINGTON CEMENT WORKS
TELEGRAMS : "CEMENT" PHONE : BURY 617
BURY, LANCASHIRE

AHF

ANHYDROUS HYDROFLUORIC ACID

AHF is the most important agent for the production of organic fluorine compounds either by replacement of chlorine atoms or by addition to unsaturated substances. Another important use is as a catalyst in the production of high-octane fuels by alkylation. Other alkylation and acylation reactions are also catalysed by AHF. It is the raw material for producing fluorine and has been used as a solvent medium for certain reactions.

PHYSICAL PROPERTIES

Boiling Point (760 mm.)	19.9°C.
Freezing Point	-83°C.
Specific Gravity (Liquid 0°C.)	1.01
Specific Heat (Liquid 0°C.)	0.85

The vapour is polymerised to a degree which varies rapidly with temperature and pressure producing a corresponding variation in the heat of vaporisation.

SPECIFICATION

The normal grade of AHF contains at least 99% HF, and impurities to the following limits:-

H_2O	0.5% max.
SO_2	0.25% max.
Si (calc. as SiF_4)	0.25% max.
H_2SO_4	0.01% max.
H_2S	may be present in traces

Higher grades up to 99.9% HF can be supplied according to need.

CONTAINERS

AHF is transported in steel tank wagons holding from 6 to 8 tons, and in steel cylinders of 6 lb., 50 lb. and 230 lb. capacity.

Advice on materials of construction, handling and first-aid measures may be obtained from

IMPERIAL SMELTING

A MEMBER OF THE CONSOLIDATED ZINC CORPORATION LIMITED

IMPERIAL SMELTING CORPORATION (SALES) LTD., 37 DOVER STREET · LONDON · W.1

Printed in Great Britain by THE PRESS AT COOMBELANDS LTD., Addlestone, and published by BENN BROTHERS LTD., at Bouverie House, 154 Fleet Street, E.C.4, 12 January 1957. Registered at the General Post Office. Entered as Second Class Matter at the New York U.S.A., Post Office.